

**ADDENDUM #1  
TO THE REQUEST FOR QUOTES FOR THE #2016-11  
OPTIRTC SITE INSTRUMENT AND INSTALLATION PROJECT**

TO: ALL BID DOCUMENT HOLDERS  
DATE: October 06, 2016

This Addendum #1 issued prior to receipt of proposals will become part of the Contract documents, superseding the originals to the applicable extent indicated. Proposers shall be responsible for issuing information to those furnishing bids and quotes to them.

**Changes:**

- The submittal date has been changed to October 18<sup>th</sup>, 2016 @ 4:00 PM.
- Use the included Lump Sum Bid form to submit quotes.
- Updates refer to updated Conceptual Design Package, included herein.

**Site walkthrough Questions**

Q. The valve detail on sheet 12 of 15 shows some items that are not specifically listed as being supplied by Opti. Are the "grated inlets" and the "valve stem mounts" supplied with the valves and actuators?

A. The valve stem mounts and grated inlets are not provided by Opti and are to be procured by the Contractor.

Q. Are the costs for getting power onsite by PGE covered by the county?

A. Yes

**Site 1- Sunnyside**

Q. Will the manhole need to have the wall sealant applied and be water tight?

A. Yes, the Contractor will be responsible to seal the weir wall along all seams and edges to provide a watertight system.

Q. Can the existing vegetation be removed if needed in order to fulfill trenching needs?

A. Yes, vegetation can be removed. Any disturbed area should be covered with matting or hydroseed to prevent erosion.

Q. What is the voltage needed for installation?

A. 120v/single phase

Q. Can you provide wire sizes needed for installation?

A. This information is included in the bid package Exhibit B, page 14 of 15.

Q. Can you provide the specs for the devices being installed?

A. Valve and Actuator specifications were included in the bid package page 15 of 15. More detailed valve specifications are included with this addendum. (See attached specs)

Q. Should some sort of erosion control be quoted in connection with the trenching that needs to be done?

A. Yes.

**Site 2 – Pond B**

Q. Are trash racks needing to be installed on inlets?

A. No, these will be supplied and installed at a later date and are not being requested for this project.

Q. Are the existing panels in the manhole being reused or replaced?

A. Re-use existing panels.

Q. Will the hardware need to be replaced with stainless steel?

A. Yes, replace with stainless steel.

Q. Is the sprinkler system a concern for Pond B?

A. No, this system is not operational and does not need to be protected.

Q. Are we needing to dig through the existing concrete around the manhole in order to install the pedestal?

A. The exact location for the pedestal can be adjusted/field fit to avoid the concrete.

**Site 3- Pond A**

Q. Solar?

A. Yes, this site will be solar. The contractor is required to purchase the solar panel from OptiRTC at \$2100.00 which should be included in the quote provided by the Contractor. Solar configuration is included in the amended bid package. (See attached Updated Conceptual Design Package)

Q. Should quote include the manhole outfall side cleanup? (Currently there is some degradation of the concrete around the piping)

A. Yes, plan to clean up the outlet pipe connection and repair existing damage.

All Proposers shall acknowledge receipt and acceptance of this Addendum #1 by signing in the space provided and submitting the signed Addendum with the response. Submittals without this Addendum may be considered informal.

George Marlton - Procurement Division Director

Received, acknowledged, and conditions agreed to this \_\_\_\_\_ day of  
\_\_\_\_\_, 2016.

**BIDDER:** \_\_\_\_\_

**BY:** \_\_\_\_\_

**LUMP SUM BID  
FOR THE**

**#2016-11 OptiRTC SITE INSTRUMENT AND INSTALLATION PROJECT**

<b>Site</b>	<b>Description</b>	<b>Total</b>
1	<i>Instrument Installation &amp; Manhole Work</i>	\$
2	<i>Instrument Installation &amp; Manhole Work</i>	\$
3	<i>Instrument Installation &amp; Manhole Work +\$2100.00 solar panel</i>	\$
	<b>Total Base Bid</b>	<b>\$</b>

Total Base Bid = \$ \_\_\_\_\_

(Numerically)

\_\_\_\_\_

(Written in Words)

**CONTRACTOR:** \_\_\_\_\_

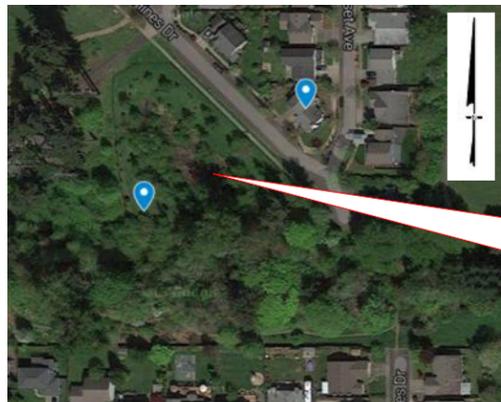
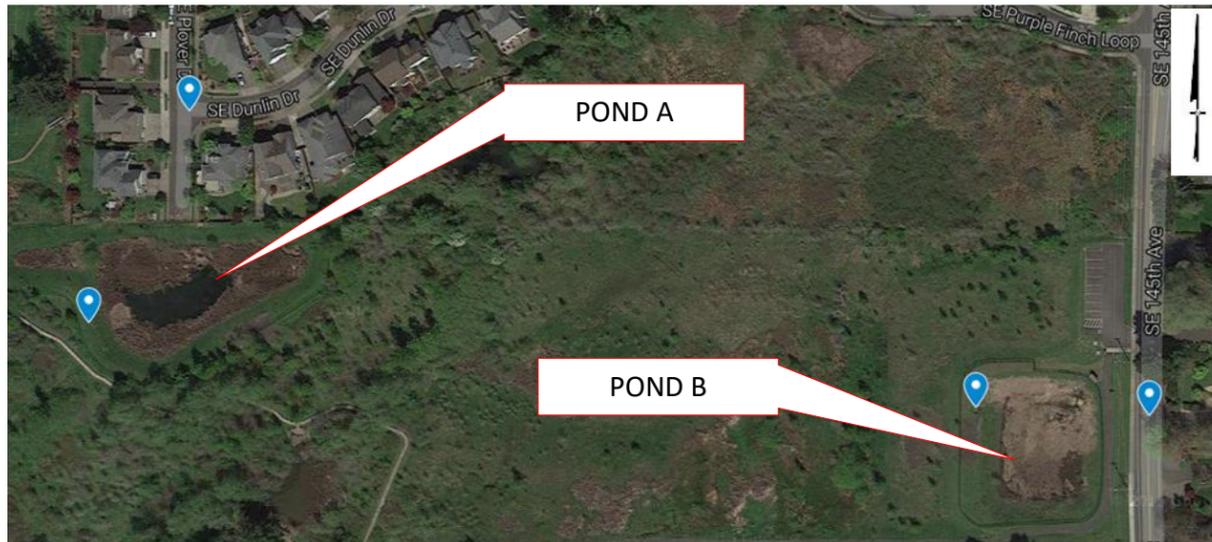
# CLACKAMAS CMAC

**SUNNY SIDE**  
 13960 SE Hines Dr, Clackamas, OR 97015  
 45.4217, -122.51041

**POND A**  
 9878 SE Plover Dr, Happy Valley, OR  
 45.45135, -122.51878

**POND B**  
 10079 SE 145th Ave Happy Valley, OR 97086  
 45.45036, -122.51433

## CONCEPTUAL DESIGN



NOTES:  
 1. AERIAL IMAGERY OBTAINED FROM GOOGLE MAPS.

LIST OF DRAWINGS	
DRAWING NO.	DRAWING TITLE
1	TITLE SHEET
2	PROJECT NOTES
3	SUNNY SIDE - EXISTING CONDITIONS
4	SUNNY SIDE - PROPOSED CONDITIONS
5	SUNNY SIDE - PROPOSED OUTLET STRUCTURE
6	POND A - EXISTING CONDITIONS
7	POND A - PROPOSED CONDITIONS
8	POND A - PROPOSED OUTLET STRUCTURE
9	POND B - EXISTING CONDITIONS
10	POND B - PROPOSED CONDITIONS
11	POND B - PROPOSED OUTLET STRUCTURE
12	OUTLET STRUCTURE DETAILS
13	PROPOSED SUPPORT POLE
14	ELECTRICAL CONDUIT SCHEDULE
15	MATERIALS PROCURED BY OPTI

PREPARED FOR:  
  
 Water Environment Services  
 150 Beaver Creek Rd.  
 Oregon City, OR 97045

PREPARED BY:  
  
 OptiRTC, Inc.  
 356 Boylston Street, 2<sup>nd</sup> Floor  
 Boston, MA 02116



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TITLE:			TITLE SHEET		
PROJECT:			CLACKAMAS CMAC		
SITE:			SUNNY SIDE, POND A, POND B		
 OptiRTC, Inc. 356 Boylston Street, 2 <sup>nd</sup> Floor Boston, MA 02116		DESIGN BY:	AMH	DATE:	10/6/2016
		DRAWN BY:	AMH	PROJECT NO.:	OP349
		CHECKED BY:		FILE:	
		REVIEWED BY:		DRAWING NO.:	1 OF 16
APPROVED BY:					

**GENERAL NOTES**

1. THE INTENT OF THIS PROJECT IS TO RETROFIT THREE EXISTING PASSIVE STORMWATER MANAGEMENT FACILITIES WITH CONTINUOUS MONITORING AND ADAPTIVE CONTROL (CMAC) TO IMPROVE WATER QUALITY AND FLOOD CONTROL OF THE FACILITIES. THIS PRIMARILY CONSISTS OF INTALLING A WATER LEVEL SENSOR, ELECTRICALLY ACTUATED VALVE, AND A SUPPORT POLE THAT INCLUDES A CONTROL PANEL.
2. WORK PERFORMED PER THE PLANS SHALL COMPLY WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL STANDARDS, PERMITTING, AND OTHER RESTRICTIONS IN EFFECT FOR CONSTRUCTION ACTIVITIES WITHIN SITE LIMITS.
3. ALL PERSONS ENGAGED IN INSTALLATION OF THE SYSTEM SHALL BE FAMILIAR WITH, AND SHALL AT ALL TIMES CONFORM TO THE REGULATIONS OF THE "OSHA GENERAL INDUSTRY OCCUPATIONAL SAFETY AND HEALTH STANDARDS," "OSHA SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION," AND OTHER APPLICABLE STATE AND MUNICIPAL STANDARDS AND REGULATIONS.
4. UPON COMPLETION OF WORK, REMOVE ALL CONSTRUCTION MATERIALS AND TRASH AND CONDUCT OTHER REASONABLE CLEAN-UP ACTIVITIES.
5. FINAL COMPLETION SHALL BE REACHED WHEN: (1) CONSTRUCTION OF THE SYSTEM PER THE PLANS IS COMPLETE; (2) AN APPROVED AS-BUILT SKETCH OF ALL INSTALLED COMPONENTS; (3) ENGINEER HAS COMPLETED FINAL INSPECTION OF WORK AND ALL NOTED DEFICIENCIES HAVE BEEN CORRECTED TO THE SATISFACTION OF THE ENGINEER AND COUNTY.

**SITE / EARTHWORK**

1. DETERMINE IF THERE ARE UNDERGROUND UTILITIES IN THE WORK AREA PRIOR TO EXCAVATION, BY CALLING OREGON 811 AT LEAST 48 HOURS PRIOR TO STARTING WORK. CONTRACTOR SHALL BE LIABLE FOR ANY DAMAGE TO UNDERGROUND UTILITIES CAUSED BY TRENCHING OR EXCAVATION.
2. THE LOCATION OF UTILITIES SHOWN ON THE PLANS ARE FOR INFORMATION AND GUIDANCE ONLY.
3. WHEN LAYING CONDUIT, OPEN ONLY THAT SECTION OF TRENCH THAT CAN BE BACKFILLED AND STABILIZED EACH DAY.
4. HOLES AND/OR TRENCHES SHALL NOT BE LEFT IN ANY LOCATIONS UNGUARDED. IF IT IS NECESSARY TO DO SO, PROVIDE SUITABLE PROTECTION AND WARNING SIGNS TO PREVENT INJURY.
5. ALL DISTURBED AREAS SHALL BE PERMANENTLY STABILIZED ACCORDING TO LOCAL REQUIREMENTS.
6. ALL PVC JOINTS SHALL BE SOLVENT GLUED TO FORM A WATERTIGHT SEAL.
7. PROVIDE AN AS-BUILT SKETCH OF ALL CONDUITS AND INSTALLED COMPONENTS FOLLOWING CONSTRUCTION.
8. ALL HARDWARE SHALL BE STAINLESS STEEL UNLESS OTHERWISE NOTED.

**ELECTRICAL**

1. INSTALLATION OF THE ELECTRICAL ENCLOSURE AND ASSOCIATED COMPONENTS (E.G., CABLING, CONDUIT, SENSORS) MUST BE PERFORMED BY A LICENSED ELECTRICIAN. IN PARTICULAR, ELECTRICIAN SHALL BE RESPONSIBLE FOR ENSURING THAT THE ELECTRICAL ENCLOSURE IS PROPERLY CONNECTED TO THE SOLAR POWER SYSTEM OR LINE POWER, EARTH GROUNDED, AND THAT CONDUIT AND CABLING IS SIZED AND INSTALLED PER THE NEC.
2. WHEN INSTALLING COMPONENTS ENSURE THAT ALL POWER IS OFF. ENGINEER OR ENGINEER'S REPRESENTATIVE WILL INSPECT INSTALLED COMPONENTS PRIOR TO ENERGIZING THE SYSTEM.
3. CONDUITS SHALL BE RIGID SCHEDULE 40 PVC UNLESS OTHERWISE NOTED.
4. CONDUIT PENETRATIONS INTO ALL EQUIPMENT AND JUNCTION BOXES SHALL BE WATERTIGHT. TO ENSURE A WATERTIGHT SEAL, ALL CONDUIT PENETRATIONS (EXTERIOR AND INTERIOR) SHALL BE SEALED WITH A COMBINATION OF DRY OAKUM (MANUFACTURED BY DE NEEF CONSTRUCTION CHEMICALS) AND DUXSEAL (MANUFACTURED BY PARKER-HANNIFIN CORP) OR EQUAL APPROVED BY ENGINEER.
5. RIGID SCHEDULE 40 CONDUIT SHALL BE INSTALLED WITH A MINIMUM COVER OF AT LEAST 18" IN ACCORDANCE WITH TABLE 300.5 OF THE NEC.
6. PROVIDE UNDERGROUND CONDUIT RUNS WITH PROVISIONS FOR DRAINING MOISTURE. SLOPE HORIZONTAL CONDUIT RUNS TO DRAIN AT A RATE OF EACH LEAST 0.25 PERCENT.
7. ALL CONDUITS SHALL HAVE A MINIMUM NOMINAL DIAMETER OF 1" AND SHALL BE SIZED PER THE NEC TO HAVE AN ADEQUATE CROSS SECTIONAL AREA FOR INSTALLED CABLES (WHICHEVER IS MORE STRINGENT).
8. FOR BENDS IN CONDUIT RUNS, PROVIDE THE MINIMUM RADIUS NECESSARY, NOT EXCEEDING 360 DEGREES OF BEND PER RUN BETWEEN JUNCTION BOXES.
9. ALL CABLING SHALL BE SUITABLE FOR DIRECT BURIAL APPLICATIONS, HAVE A MINIMUM TEMPERATURE RATING OF 75 DEGREES C FOR USE IN WET LOCATIONS, HAVE A THWN JACKET FOR USE IN WET LOCATIONS, AND HAVE SOLID COPPER CONDUCTORS.
10. ALL CABLE SPLICES MUST BE MADE WITHIN JUNCTION BOXES AND SHALL BE LIQUID TIGHT AND SHALL BE SOLDERED AND COVERED WITH DUAL WALL HEAT SHRINK. WIRE NUTS SHALL NOT BE ALLOWED FOR ANY CONNECTIONS.
11. ALL JUNCTION BOXES (IF NEEDED) SHALL BE INSTALLED ABOVE GRADE AND INSTALLED SO NO WATER MAY PENETRATE ANY SEALS.
12. LEAVE MINIMUM OF 1 FOOT SPARE CABLING NEATLY COILED IN JUNCTION BOXES FOR FUTURE MAINTENANCE OR SYSTEM MODIFICATIONS.
13. ALL SENSOR CABLES SHALL BE LABELLED AT EACH END (AT THE SENSOR AND IN THE CONTROL PANEL) AND THE LABELS REDLINED IN THE SITE LAYOUT MAP.



TITLE:				PROJECT NOTES			
PROJECT:				CLACKAMAS CMAC			
SITE:				SUNNY SIDE, POND A, POND B			
 OptiRTC, Inc. 356 Boylston Street, 2 <sup>nd</sup> Floor Boston, MA 02116		DESIGN BY:	AMH	DATE:	10/6/2016		
		DRAWN BY:	AMH	PROJECT NO.:	OP349		
		CHECKED BY:		FILE:			
		REVIEWED BY:		DRAWING NO.:	2 OF 16		
APPROVED BY:							

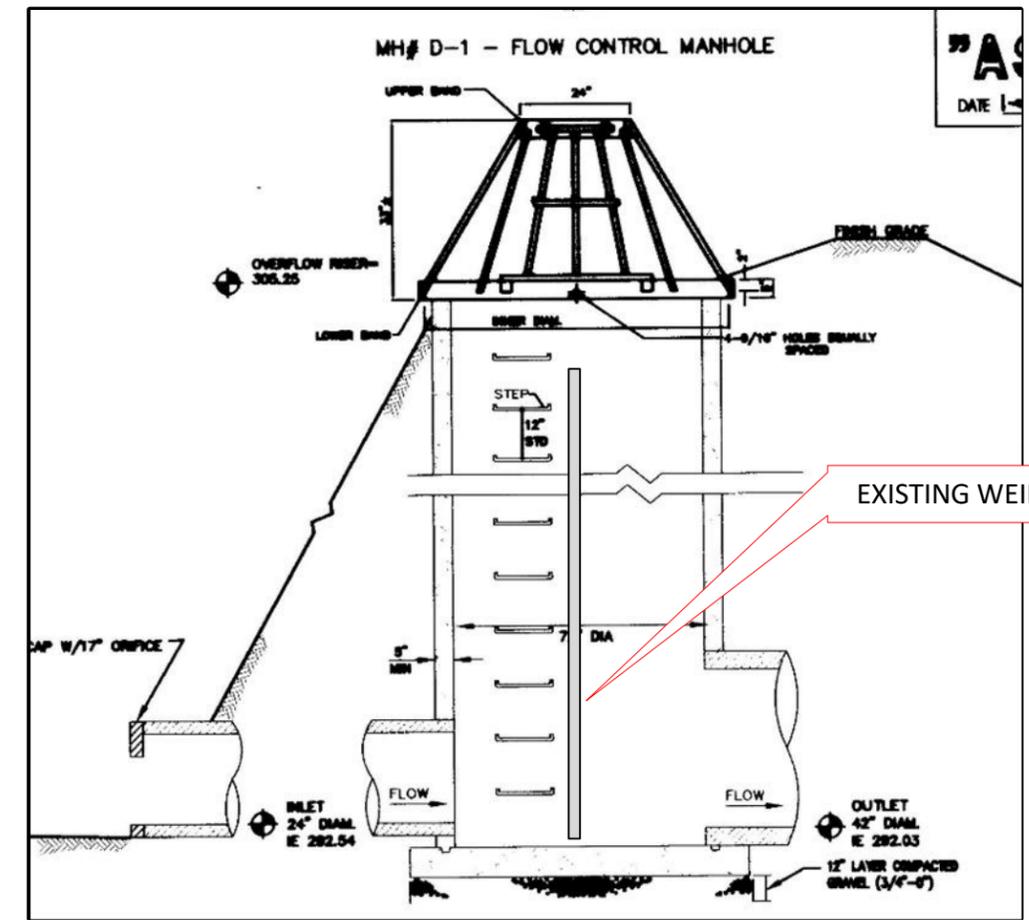
NOT TO SCALE NOT FOR CONSTRUCTION

**SUNNY SIDE SITE AERIAL**



EXISTING OUTLET STRUCTURE

**OUTLET STRUCTURE**



NOT TO SCALE

EXISTING WEIR WALL

**PICTURE OF WEIR WALL**

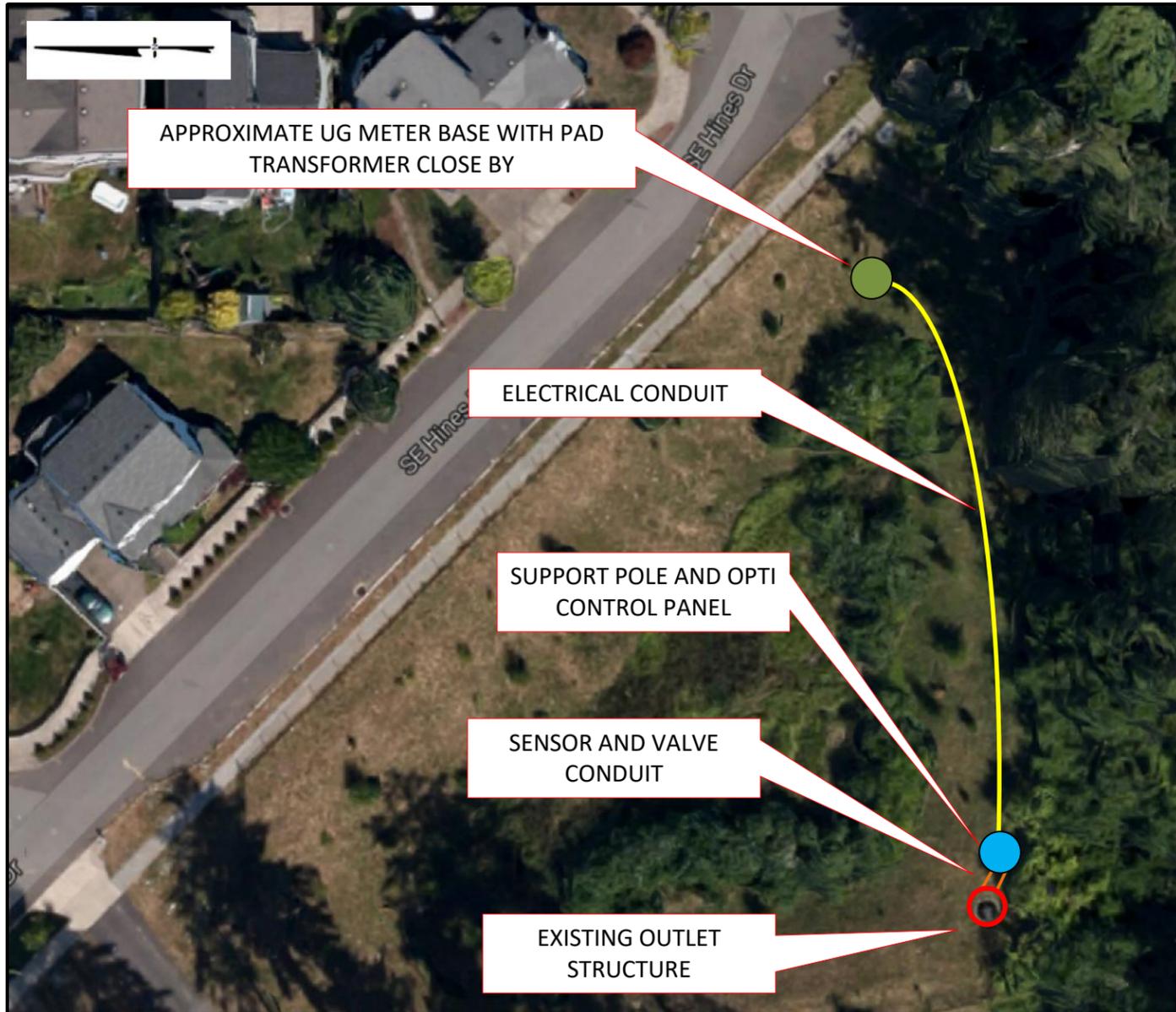


EXISTING WEIR WALL

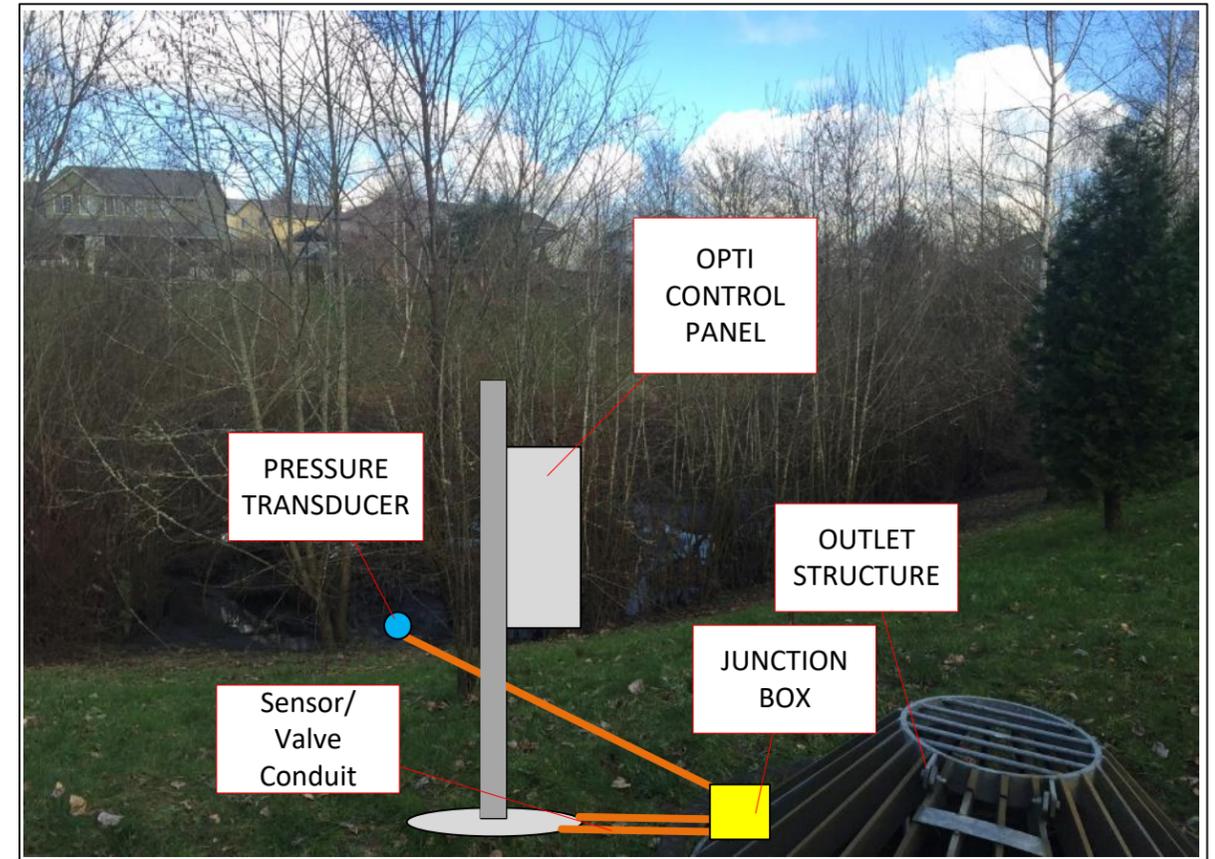
TITLE:		SUNNY SIDE - EXISTING CONDITIONS	
PROJECT:		CLACKAMAS CMAC	
SITE:		SUNNY SIDE, POND A, POND B	
 OptiRTC, Inc. 356 Boylston Street, 2 <sup>nd</sup> Floor Boston, MA 02116	DESIGN BY:	AMH	DATE: 10/6/2016
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	REVIEWED BY:		DRAWING NO.:
	APPROVED BY:		3 OF 16

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### AERIAL VISUAL OF PROPOSED SITE LAYOUT



### ONSITE VISUAL OF PROPOSED CONTROL PANEL INSTALL



#### SCOPE OF WORK

CONTRACTOR WILL INSTALL AN APPROVED METER PEDESTAL ACCORDING TO PORTLAND GENERAL ELECTRIC (PGE) REGULATIONS. PGE WILL PROVIDE METER AND POWER DROP TO THE METER WITHIN 60FT OF THE RIGHT OF WAY.

CONTRACTOR WILL INSTALL CONDUIT FROM METER TO OPTI CONTROL PANEL TO PROVIDE 120V, 20AMP SERVICE TO CONTROL PANEL. CONDUIT WILL BE RUN ALONG THE FENCE OR TRENCHED ACCORDING TO INSTALLATION METHOD ACCEPTABLE BY LOCAL ELECTRICAL CODE. CONTRACTOR WILL INSTALL A POLE CONCRETED IN PLACE NEXT TO THE EXISTING OUTLET STRUCTURE, AND MOUNT THE OPTI CONTROL PANEL TO THE POLE.

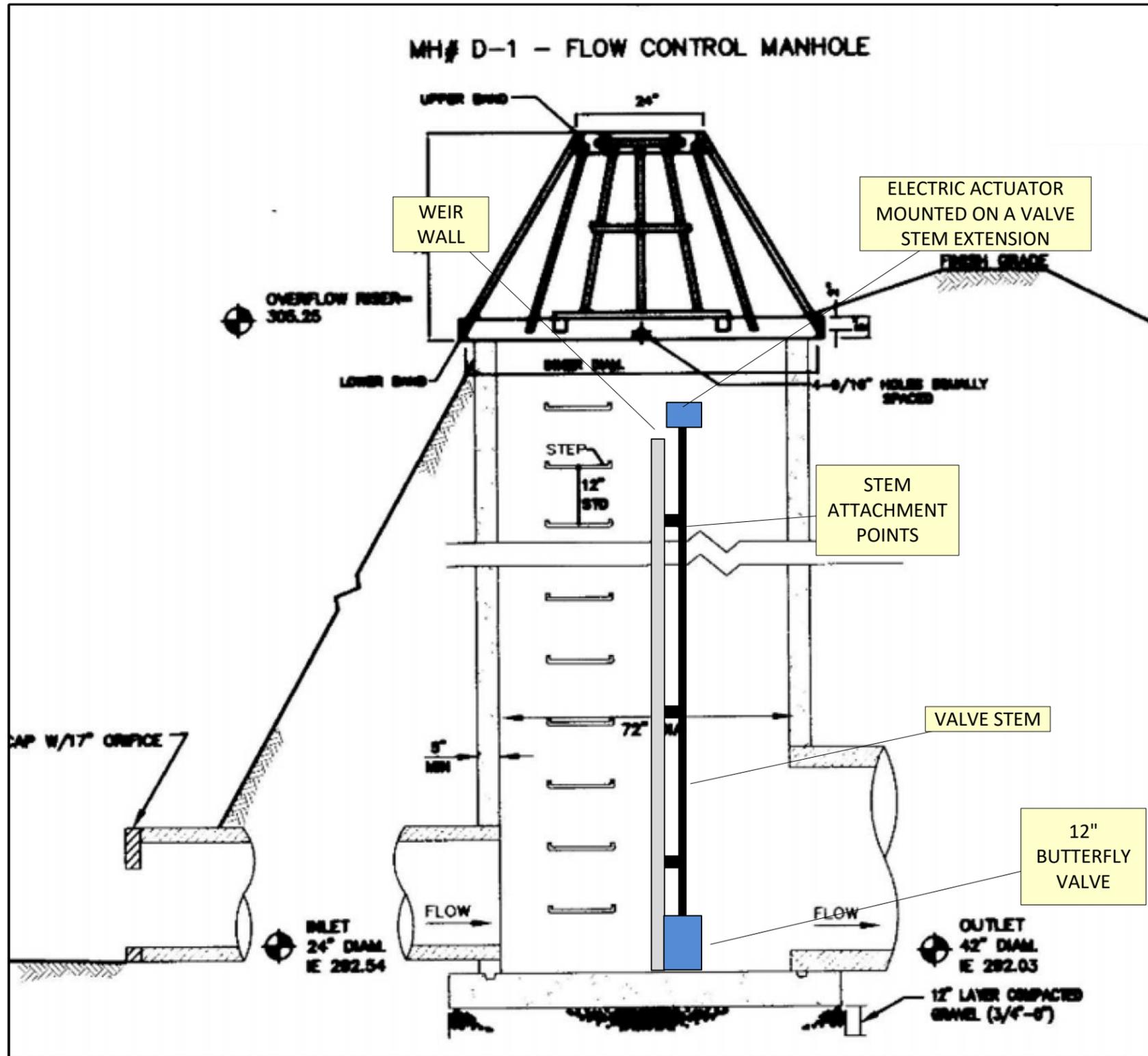
CONTRACTOR WILL REMOVE THE TOP PANEL OF THE EXISITING WEIR WALL AND INSTALL THE 12" BUTTERFLY VALVE AT IN THE BOTTOM PANEL OF THE WEIR WALL AND SECURE THE ACTUATOR STEM TO THE WEIR WALL. CONTRACTOR WILL MOUNT A PRESSURE TRANSDUCER IN A STILLING WELL INSIDE THE OUTLET STRUCTURE TO MEASURE WATER LEVEL.

CONTRACTOR WILL INSTALL TWO CONDUITIS FROM CONTROL PANEL TO THE OUTLET STRUCTURE FOR SIGNAL WIRE AND POWER. CONTRACTOR SHALL WIRE AND MAKE ALL ELECTRICAL CONNECTIONS AS SPECIFIED IN PLANS.

CONTRACTOR WILL INSTALL TRASH RACK AT INLET PIPE TO THE OUTLET STRUCTURE TO PREVENT DEBRIS FROM REACHING THE VALVE.

TITLE: SUNNY SIDE -PROPOSED CONDITIONS			
PROJECT: CLACKAMAS CMAC			
SITE: SUNNY SIDE, POND A, POND B			
 OptiRTC, Inc. 356 Boylston Street, 2 <sup>nd</sup> Floor Boston, MA 02116	 WATER ENVIRONMENT SERVICES	DESIGN BY: AMH	DATE: 10/6/2016
		DRAWN BY: AMH	PROJECT NO.: OP349
		CHECKED BY:	FILE:
		REVIEWED BY:	DRAWING NO.:
		APPROVED BY:	4 OF 16

PROPOSED OUTLET STRUCTURE



NOTES

CONTRACTOR WILL REMOVE THE TOP PANEL OF THE EXISTING WEIR WALL.

CONTRACTOR WILL INSTALL TRASHRACK ON INLET TO OUTLET STRUCTURE.

CONTRACTOR WILL INSTALL THE 12" BUTTERFLY VALVE WITH 10FT EXTENDED STEM AT IN THE BOTTOM PANEL OF THE WEIR WALL AND SECURE THE ACTUATOR STEM TO THE WEIR WALL. THE BUTTERFLY VALVE WILL BE INSTALLED OVER EXISTING ORIFICE OR THE ORIFICE SHALL BE COVERED. EXISTING MANUAL SLIDEGATE VALVE WILL BE LEFT INTACT AND OPERATIONAL.

CONTRACTOR WILL MOUNT A PRESSURE TRANSDUCER IN A STILLING WELL OUTSIDE OF THE OUTLET STRUCTURE TO MEASURE WATER LEVEL.

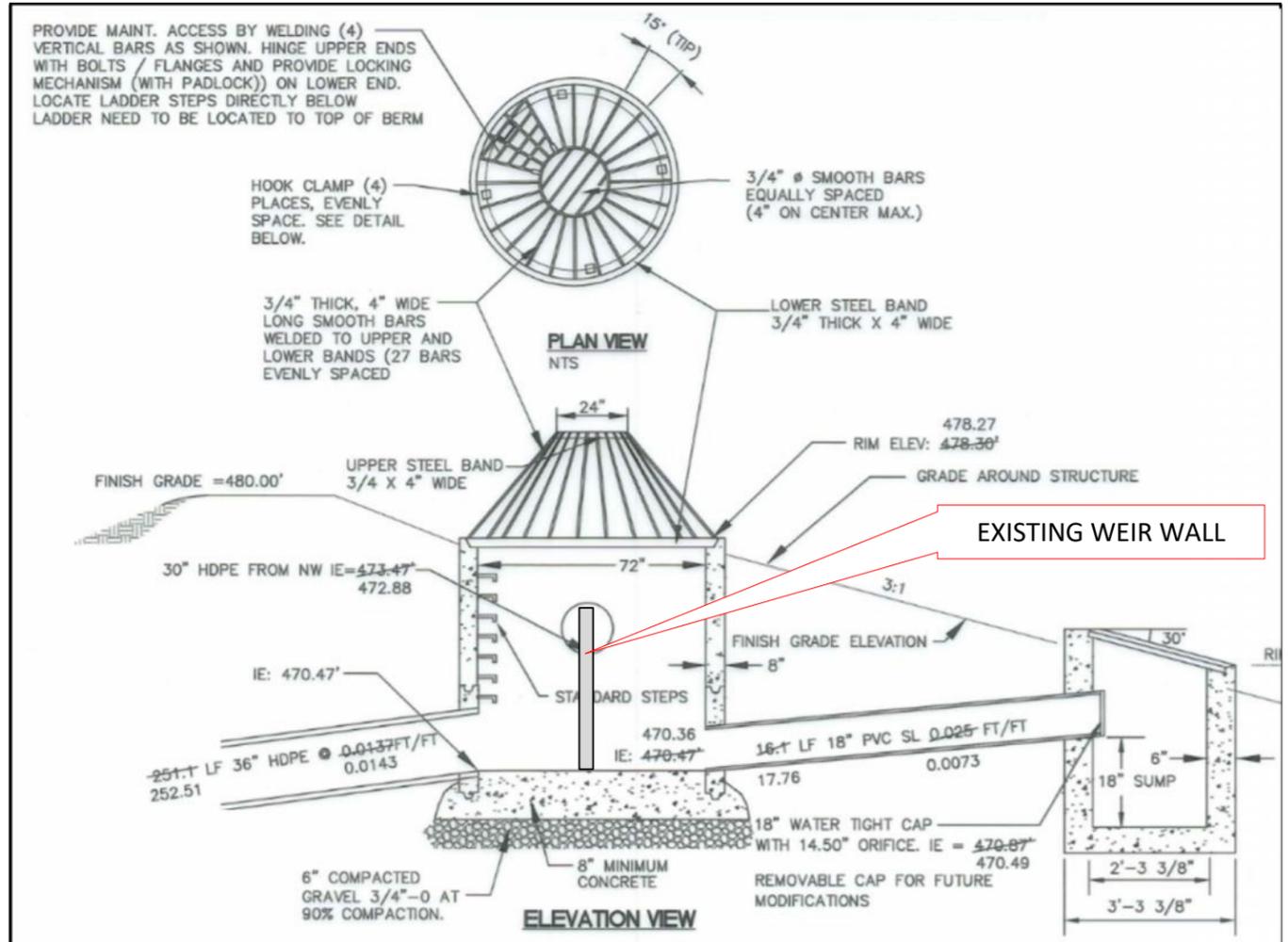
CONTRACTOR SHALL INSTALL COMPOUND AT EDGE AND SEAMS OF WEIRWALL TO ENSURE IT IS WATERTIGHT.

TITLE: SUNNY SIDE - PROPOSED OUTLET STRUCTURE				
PROJECT: CLACKAMAS CMAC				
SITE: SUNNY SIDE, POND A, POND B				
 OptiRTC, Inc. 356 Boylston Street, 2 <sup>nd</sup> Floor Boston, MA 02116	DESIGN BY:	AMH	DATE:	10/6/2016
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	APPROVED BY:			5 OF 16
 WATER ENVIRONMENT SERVICES				

**POND A SITE AERIAL**



**OUTLET STRUCTURE**



NOT TO SCALE

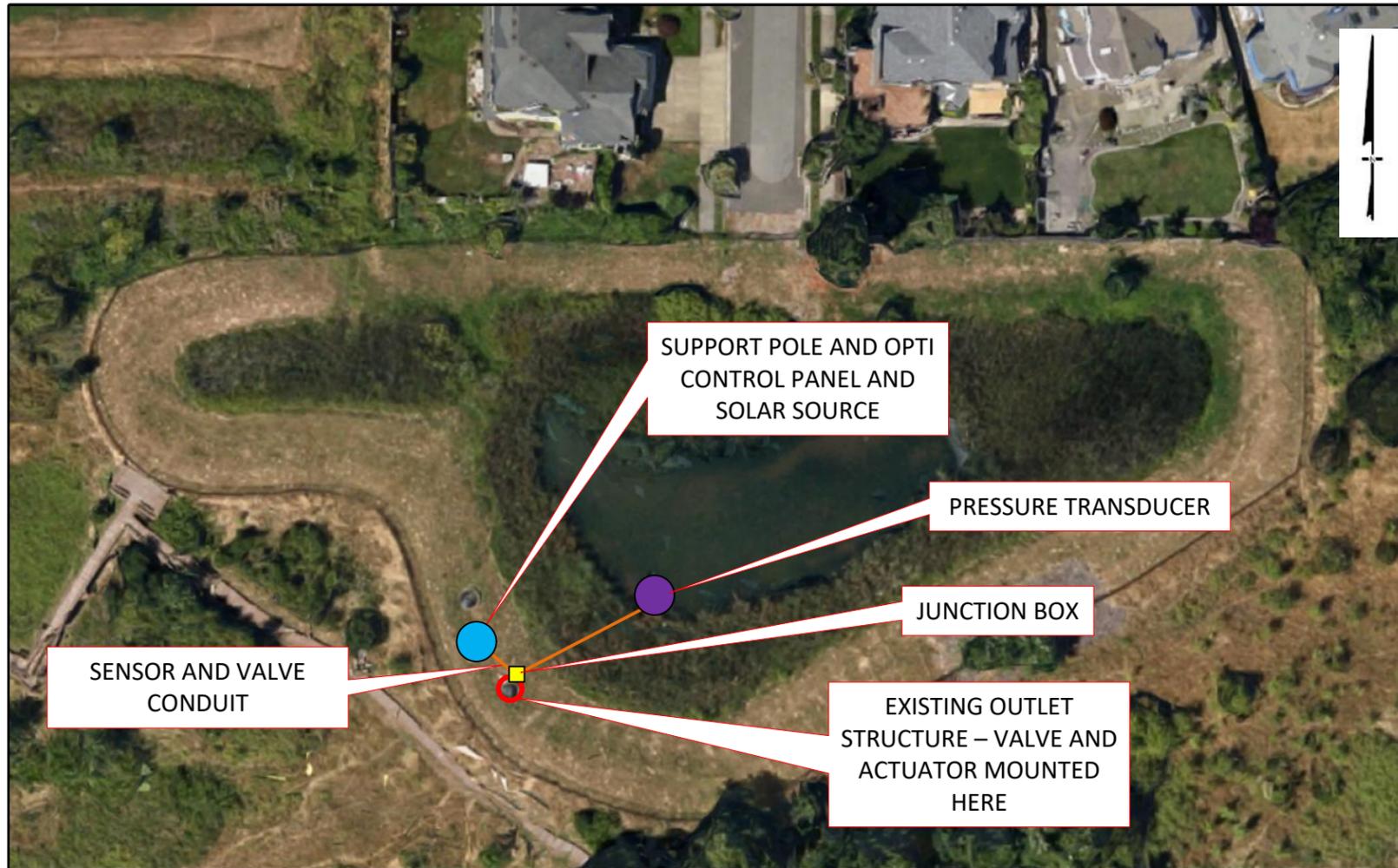
**EXISTING OUTLET STRUCTURE**



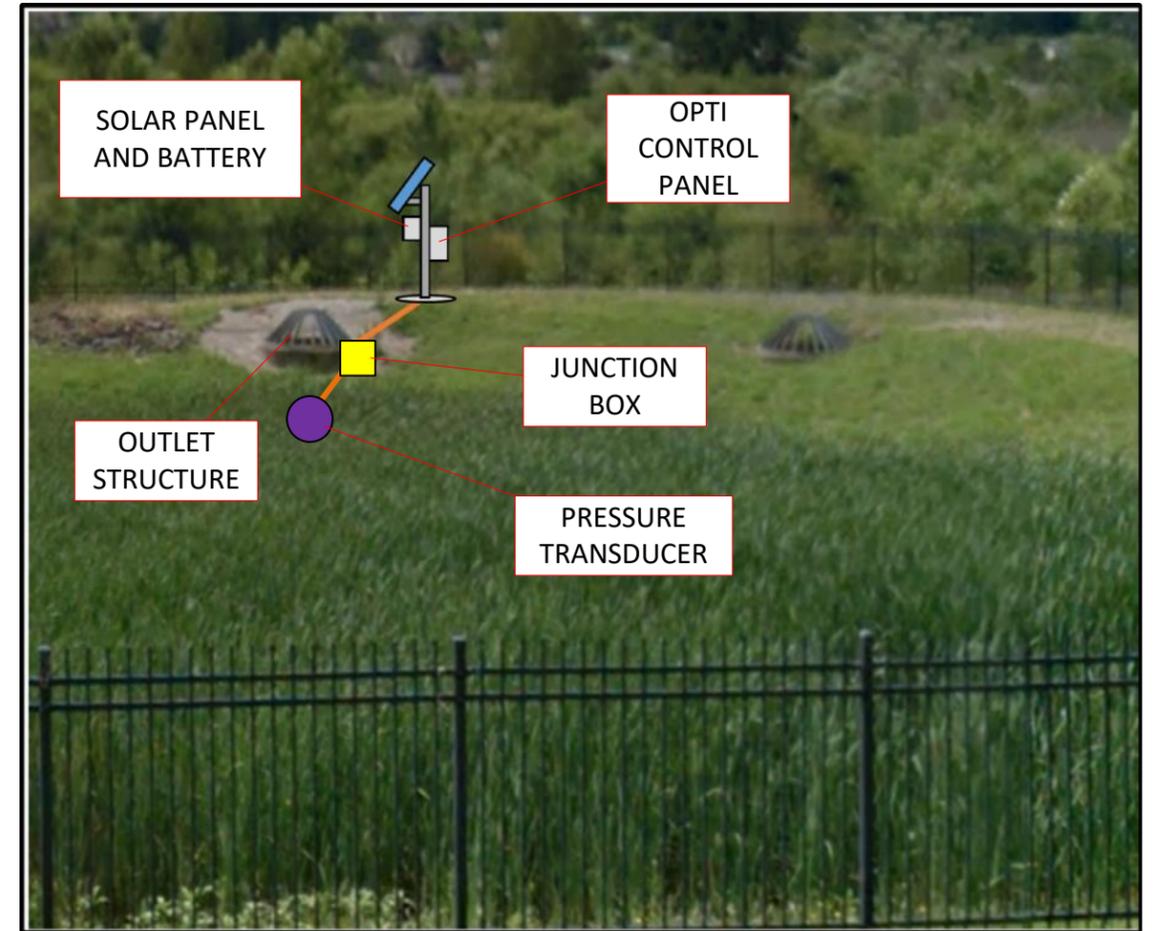
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TITLE:	POND A - EXISTING CONDITIONS			
PROJECT:	CLACKAMAS CMAC			
SITE:	SUNNY SIDE, POND A, POND B			
 OptiRTC, Inc. 356 Boylston Street, 2 <sup>nd</sup> Floor Boston, MA 02116	DESIGN BY:	AMH	DATE:	10/6/2016
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	APPROVED BY:			

**AERIAL VISUAL OF PROPOSED SITE LAYOUT**



**ONSITE VISUAL OF PROPOSED CONTROL PANEL INSTALL**



**SCOPE OF WORK**

CONTRACTOR WILL INSTALL A POLE CONCRETED IN PLACE NEXT TO THE EXISTING OUTLET STRUCTURE, AND MOUNT THE OPTI CONTROL PANEL, SOLAR CONTROLLER, AND SOLAR PANEL TO THE POLE.

CONTRACTOR WILL REMOVE THE TOP PANEL OF THE EXISTING WEIR WALL AND INSTALL THE 12" BUTTERFLY VALVE AT IN THE BOTTOM PANEL OF THE WEIR WALL AND SECURE THE ACTUATOR STEM TO THE WEIR WALL. A PRESSURE TRANSDUCER SHALL BE MOUNTED IN A STILLING WELL INSIDE THE OUTLET STRUCTURE TO MEASURE WATER LEVEL.

THE CONTRACTOR WILL INSTALL A PRESSURE TRANSDUCER TO MEASURE THE POND WATER LEVEL. THE PRESSURE TRANSDUCER WILL HAVE CONDUIT RUN FROM ITS LOCATION TO A JUNCTION BOX INSTALLED BY THE CONTRACTOR. THIS JUNCTION BOX WILL JOINING THE ACTUATOR AND SENSOR CONDUIT RUNS TO THE CONTROL PANEL.

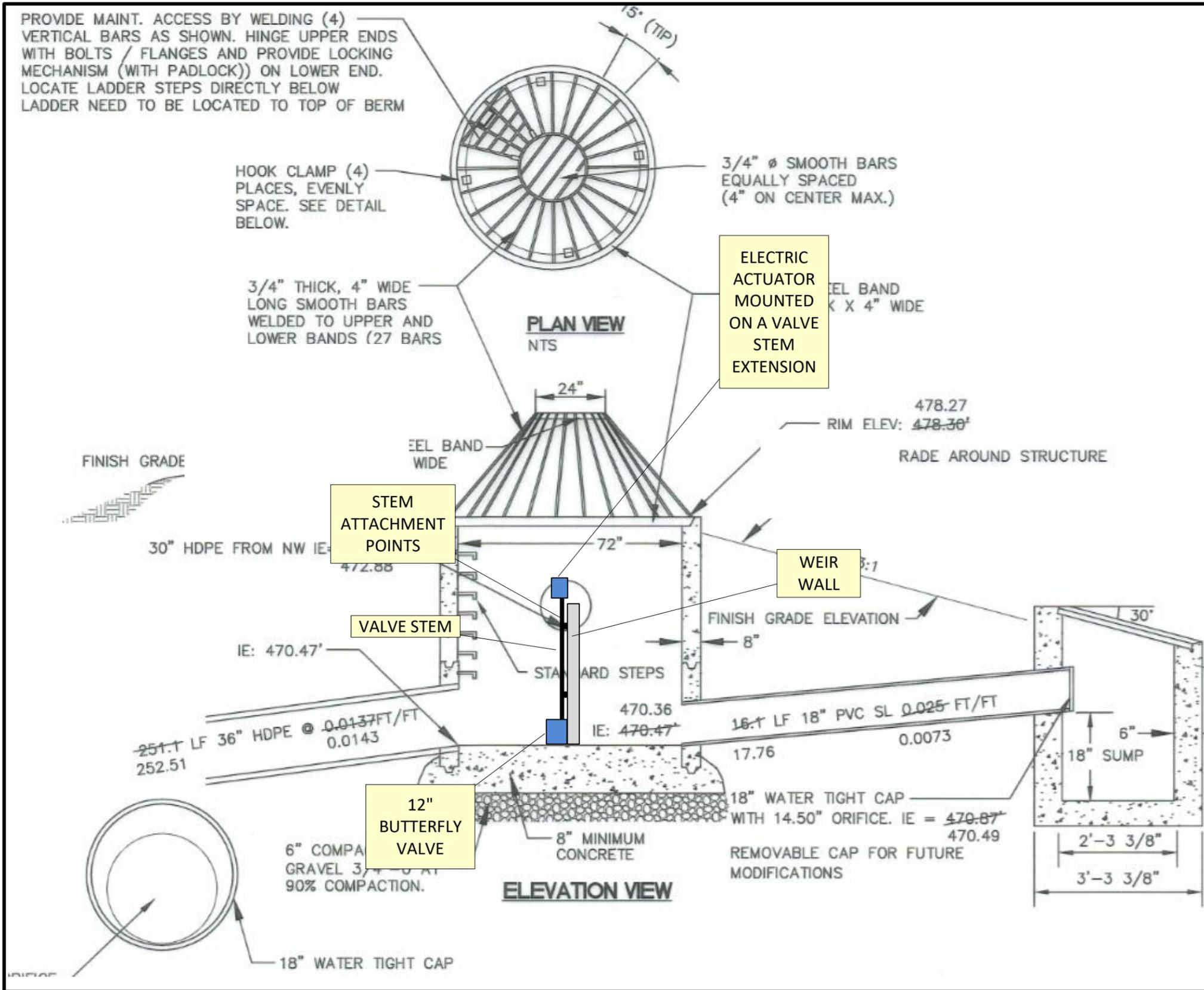
CONTRACTOR WILL INSTALL TWO CONDUITS FROM CONTROL PANEL TO THE OUTLET STRUCTURE FOR SIGNAL WIRE AND POWER. CONTRACTOR SHALL WIRE MAKE ALL ELECTRICAL CONNECTIONS AS SPECIFIED IN PLANS.

NOT TO SCALE NOT FOR CONSTRUCTION

CONTRACTOR WILL INSTALL TRASH RACK AT INLET PIPE TO THE OUTLET STRUCTURE TO PREVENT DEBRIS FROM REACHING THE VALVE.

TITLE:	POND A - PROPOSED CONDITIONS			
PROJECT:	CLACKAMAS CMAC			
SITE:	SUNNY SIDE, POND A, POND B			
 OptiRTC, Inc. 356 Boylston Street, 2 <sup>nd</sup> Floor Boston, MA 02116	DESIGN BY:	AMH	DATE:	10/6/2016
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	APPROVED BY:			

**PROPOSED OUTLET STRUCTURE**



**NOTES**

CONTRACTOR WILL REMOVE THE TOP PANEL OF THE EXISTING WEIR WALL.

CONTRACTOR WILL INSTALL TRASHRACK ON INLET TO OUTLET STRUCTURE.

CONTRACTOR WILL INSTALL THE 12" BUTTERFLY VALVE WITH 10 FT EXTENDED STEM AT IN THE BOTTOM PANEL OF THE WEIR WALL AND SECURE THE ACTUATOR STEM TO THE WEIR WALL. THE BUTTERFLY VALVE WILL BE INSTALLED OVER EXISTING ORIFICE OR THE ORIFICE SHALL BE COVERED. EXISTING MANUAL SLIDEGATE VALVE WILL BE LEFT INTACT AND OPERATIONAL.

CONTRACTOR WILL MOUNT A PRESSURE TRANSDUCER IN A STILLING WELL OUTSIDE OF THE OUTLET STRUCTURE TO MEASURE WATER LEVEL.

CONTRACTOR SHALL INSTALL COMPOUND AT EDGE AND SEEMS OF WEIRWALL TO ENSURE IT IS WATERTIGHT.

TITLE:	POND A - PROPOSED OUTLET STRUCTURE	
PROJECT:	CLACKAMAS CMAC	
SITE:	SUNNY SIDE, POND A, POND B	

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	APPROVED BY:			

**POND A SITE AERIAL**

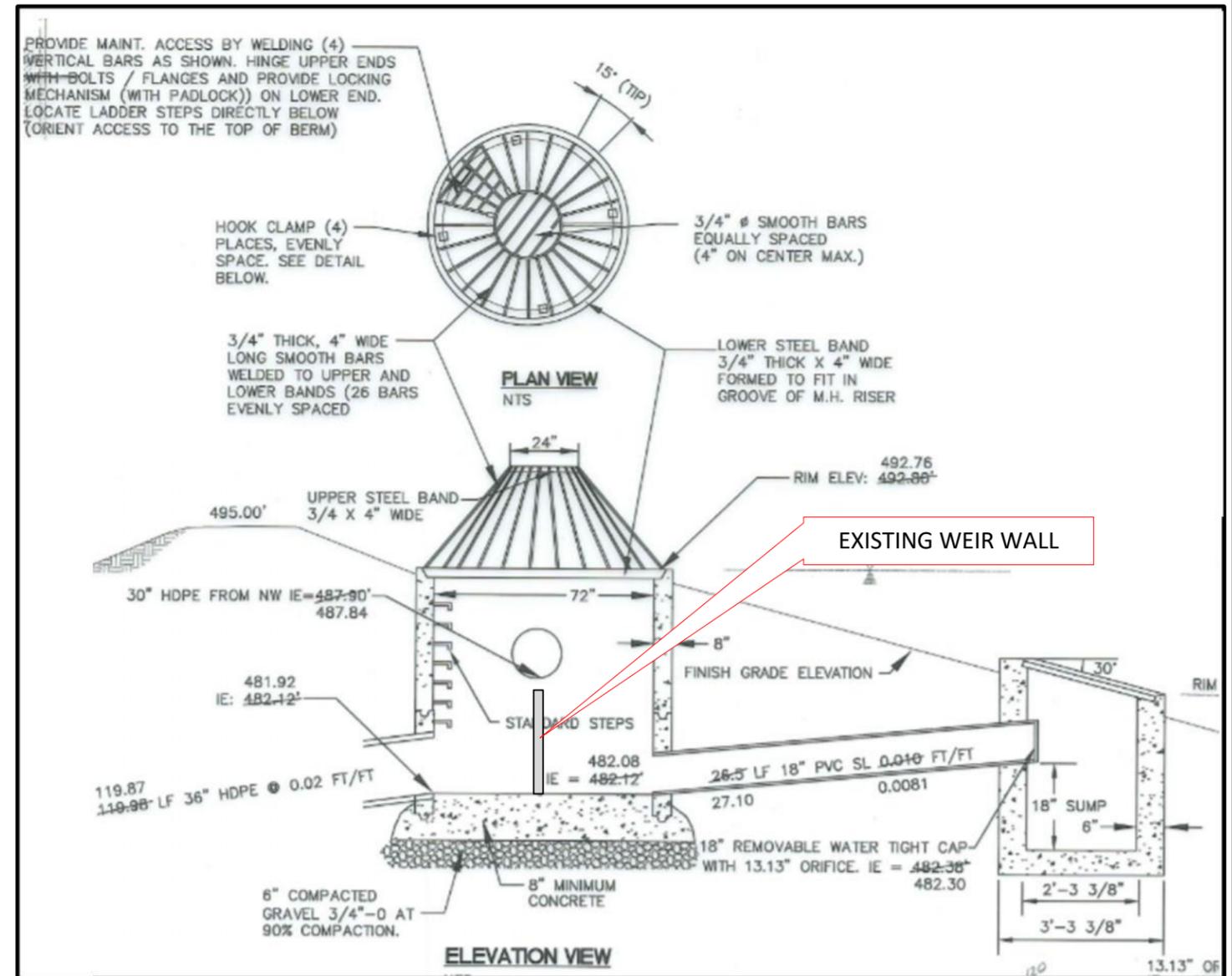


**EXISTING OUTLET STRUCTURE**



EXISTING WEIR WALL

**OUTLET STRUCTURE**



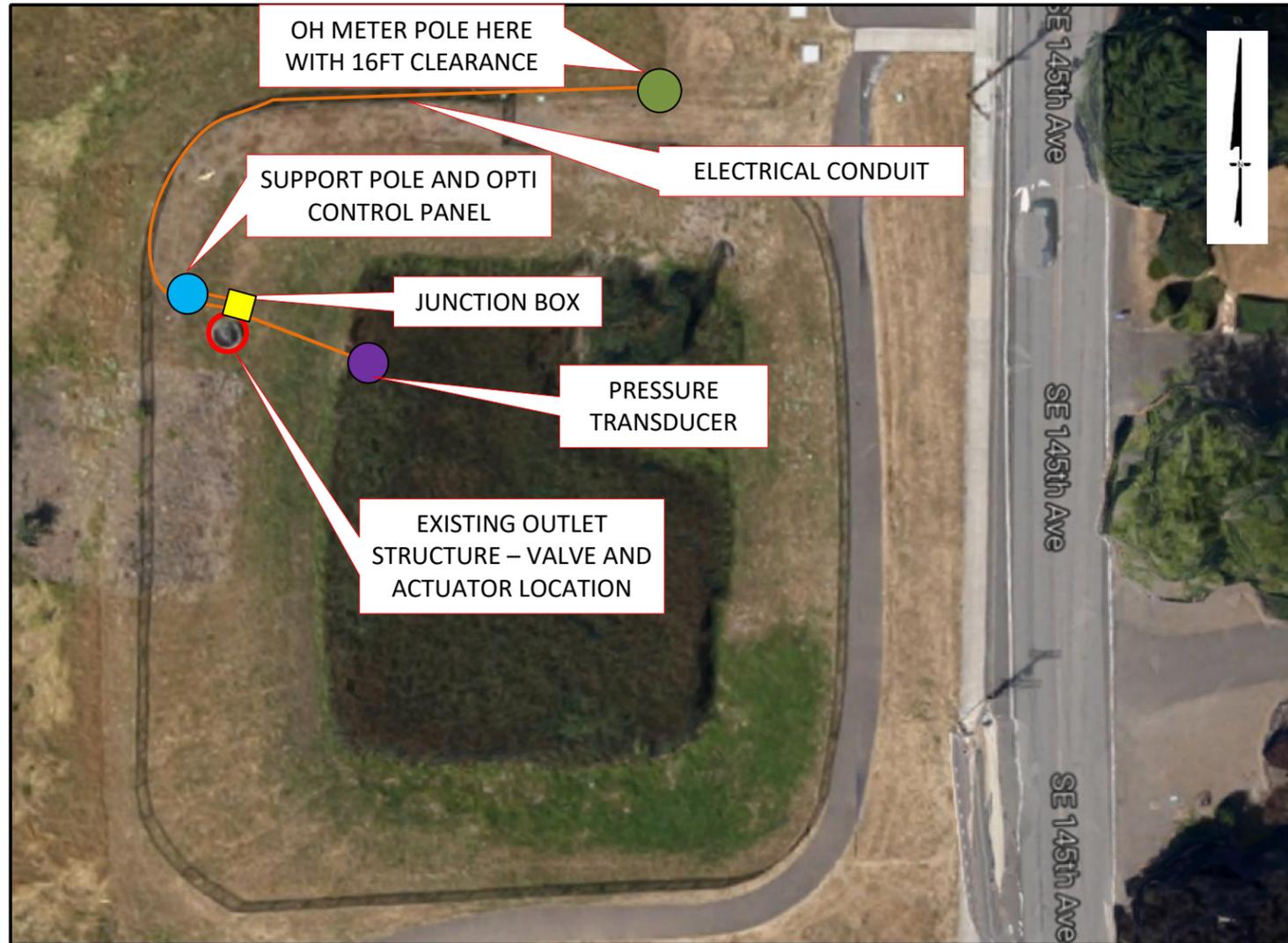
EXISTING WEIR WALL

NOT TO SCALE

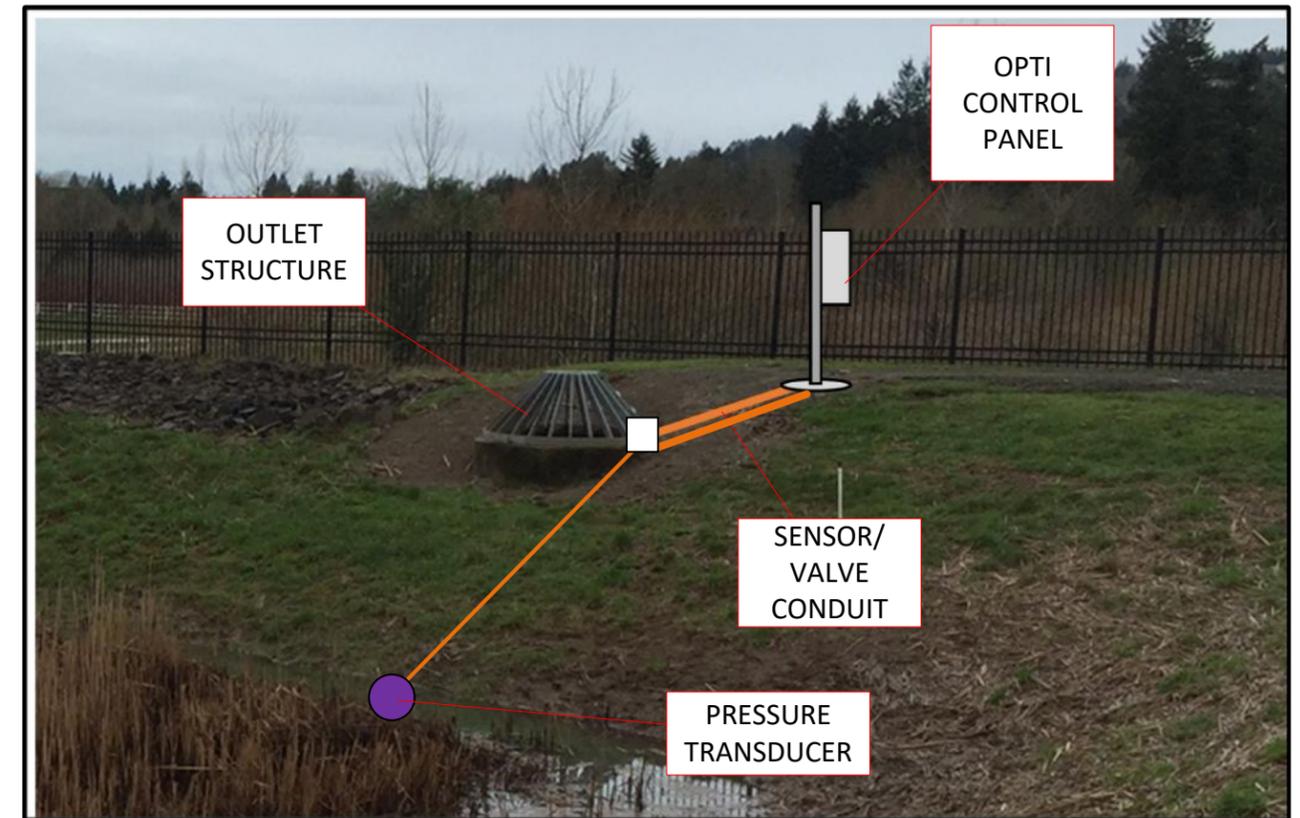
NOT TO SCALE NOT FOR CONSTRUCTION

TITLE:	POND B - EXISTING CONDITIONS		
PROJECT:	CLACKAMAS CMAC		
SITE:	SUNNY SIDE, POND A, POND B		
 OptiRTC, Inc. 356 Boylston Street, 2 <sup>nd</sup> Floor Boston, MA 02116	DESIGN BY:	AMH	DATE: 10/6/2016
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APPROVED BY:			9 OF 16

**AERIAL VISUAL OF PROPOSED SITE LAYOUT**



**ONSITE VISUAL OF PROPOSED CONTROL PANEL INSTALL**



**SCOPE OF WORK**

CONTRACTOR WILL INSTALL AN APPROVED METER PEDESTAL ACCORDING TO PORTLAND GENERAL ELECTRIC (PGE) REGULATIONS. PGE WILL PROVIDE A METER AND POWER DROP TO THE METER WITHIN 60FT OF THE RIGHT OF WAY.

CONTRACTOR WILL INSTALL CONDUIT FROM METER TO OPTI CONTROL PANEL TO PROVIDE 120V, 20AMP SERVICE TO CONTROL PANEL. CONDUIT WILL BE RUN ALONG THE FENCE OR TRENCHED ACCORDING TO INSTALLATION METHOD ACCEPTABLE BY LOCAL ELECTRICAL CODE.

CONTRACTOR WILL INSTALL A POLE CONCRETED IN PLACE NEXT TO THE EXISTING OUTLET STRUCTURE, AND MOUNT THE OPTI CONTROL PANEL TO THE POLE.

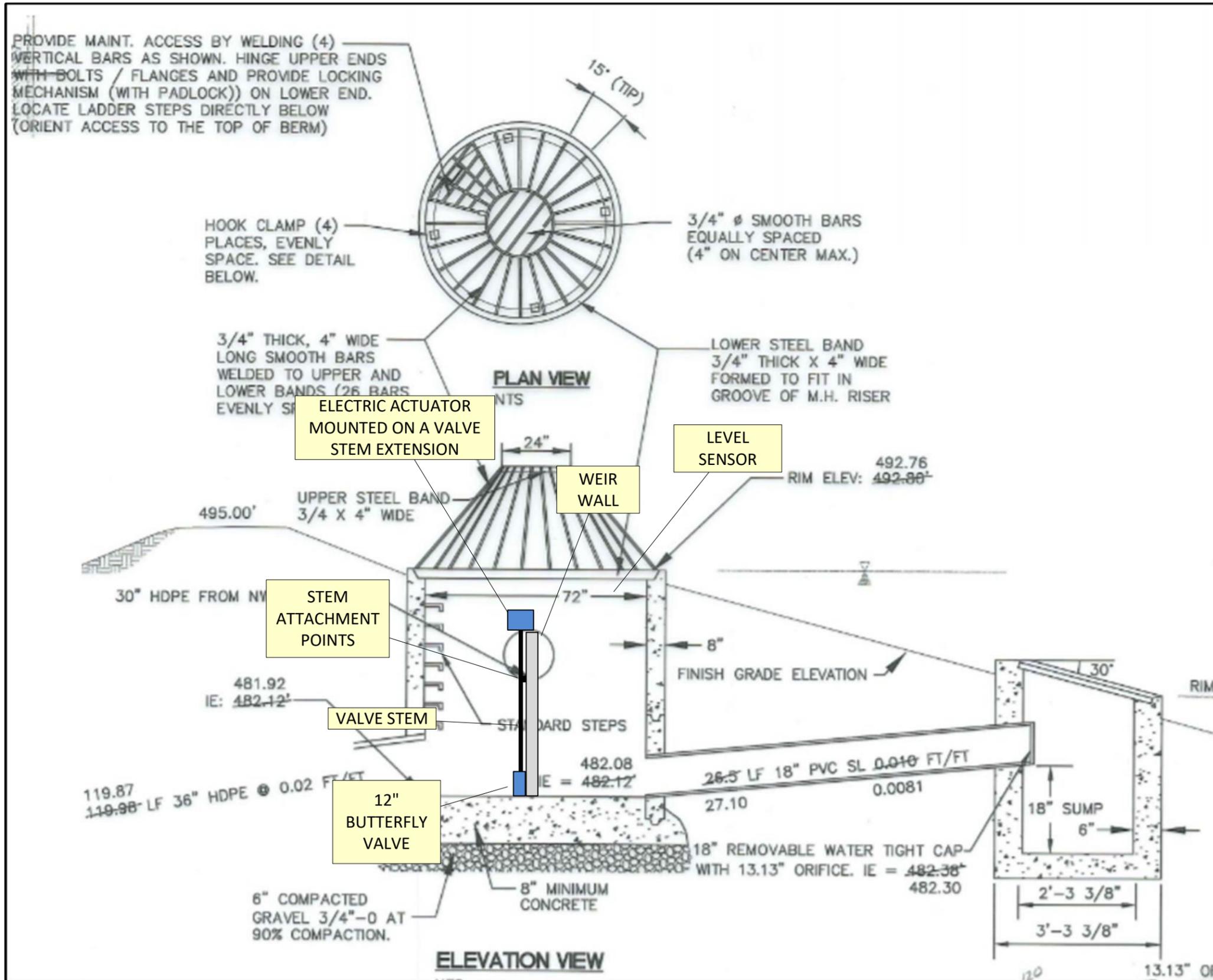
CONTRACTOR WILL REMOVE ENTIRE WEIR WALL, REMOVE THE TOP PANEL OF THE EXISITING WEIR WALL AND INSTALL THE 12" BUTTERFLY VALVE AT IN THE BOTTOM PANEL OF THE WEIR WALL AND SECURE THE ACTUATOR STEM TO THE WEIR WALL. WEIR WALL WILL BE REINSTALLED IN OUTLET STRUCTURE AT A NEW ORIENTATION SUCH THAT THE INLETS AND OUTLETS ARE SEPERATED BY THE WEIR WALL. A PRESSURE TRANSDUCER SHALL BE MOUNTED IN A STILLING WELL INSIDE THE OUTLET STRUCTURE TO MEASURE WATER LEVEL.

CONTRACTOR WILL INSTALL TWO CONDUITIS FROM CONTROL PANEL TO THE OUTLET STRUCTURE FOR SIGNAL WIRE AND POWER. CONTRACTOR SHALL WIRE MAKE ALL ELECTRICAL CONNECTIONS AS SPECIFIED IN PLANS.

CONTRACTOR WILL INSTALL TRASH RACK AT INLET PIPE TO THE OUTLET STRUCTURE TO PREVENT DEBRIS FROM REACHING THE VALVE.

TITLE:	POND B - PORPOSED CONDITIONS				
PROJECT:	CLACKAMAS CMAC				
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 OptiRTC, Inc. 356 Boylston Street, 2 <sup>nd</sup> Floor Boston, MA 02116	 WATER ENVIRONMENT SERVICES	DESIGN BY:	AMH	DATE:	10/6/2016
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APPROVED BY:					10 OF 16

**PROPOSED OUTLET STRUCTURE**



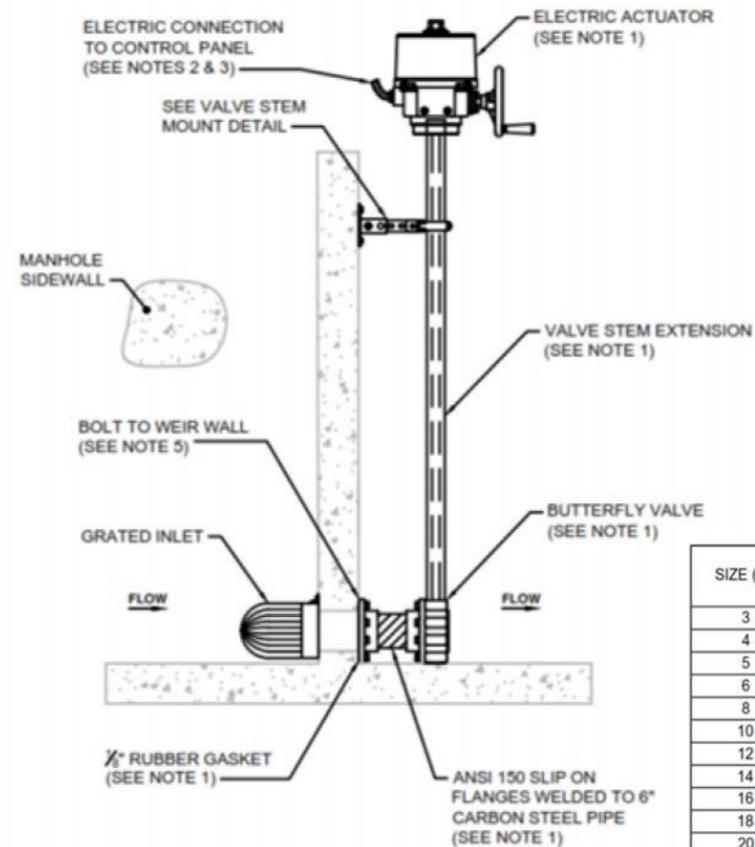
**NOTES**

- CONTRACTOR WILL REMOVE THE TOP PANEL OF THE EXISTING WEIR WALL.
- CONTRACTOR WILL INSTALL TRASHRACK ON INLET TO OUTLET STRUCTURE.
- CONTRACTOR WILL INSTALL THE 12" BUTTERFLY VALVE WITH 8 FT EXTENDED STEM AT IN THE BOTTOM PANEL OF THE WEIR WALL AND SECURE THE ACTUATOR STEM TO THE WEIR WALL. THE BUTTERFLY VALVE WILL BE INSTALLED OVER EXISTING ORIFICE OR THE ORIFICE SHALL BE COVERED. EXISTING MANUAL SLIDEGATE VALVE WILL BE LEFT INTACT AND OPERATIONAL.
- CONTRACTOR WILL MOUNT A PRESSURE TRANSDUCER IN A STILLING WELL OUTSIDE OF THE OUTLET STRUCTURE TO MEASURE WATER LEVEL.
- CONTRACTOR SHALL INSTALL COMPOUND AT EDGE AND SEAMS OF WEIRWALL TO ENSURE IT IS WATERTIGHT.

TITLE:	POND B - PROPOSED OUTLET STRUCTURE		
PROJECT:	CLACKAMAS CMAC		
SITE:	SUNNY SIDE, POND A, POND B		
DESIGN BY:	AMH	DATE:	10/6/2016
DRAWN BY:	AMH	PROJECT NO.:	OP349
CHECKED BY:		FILE:	
REVIEWED BY:		DRAWING NO.:	11 OF 16
APPROVED BY:			



### GENERIC DETAIL – BUTTERFLY VALVE



SIZE (IN)	BOLT CIRCLE (IN)	# HOLES x TAPPED SIZE - SAE THREAD	ISO FLANGE TYPE
3	6	4 x 5/8 - 11 UNC	F05
4	7.5	8 x 5/8 - 11 UNC	F07
5	8.5	8 x 3/4 - 10 UNC	F07
6	9.5	8 x 3/4 - 10 UNC	F07
8	11.75	8 x 3/4 - 10 UNC	F10
10	14.25	12 x 7/8 - 9 UNC	F10
12	17	12 x 7/8 - 9 UNC	F10
14	18.75	12 x 1 - 8 UNC	F10
16	21.25	16 x 1 - 8 UNC	F14
18	22.75	16 x 1 1/8 - 7 UNC	F14
20	25	20 x 1 1/8 - 7 UNC	F16
24	29.5	20 x 1 1/4 - 7 UNC	F16

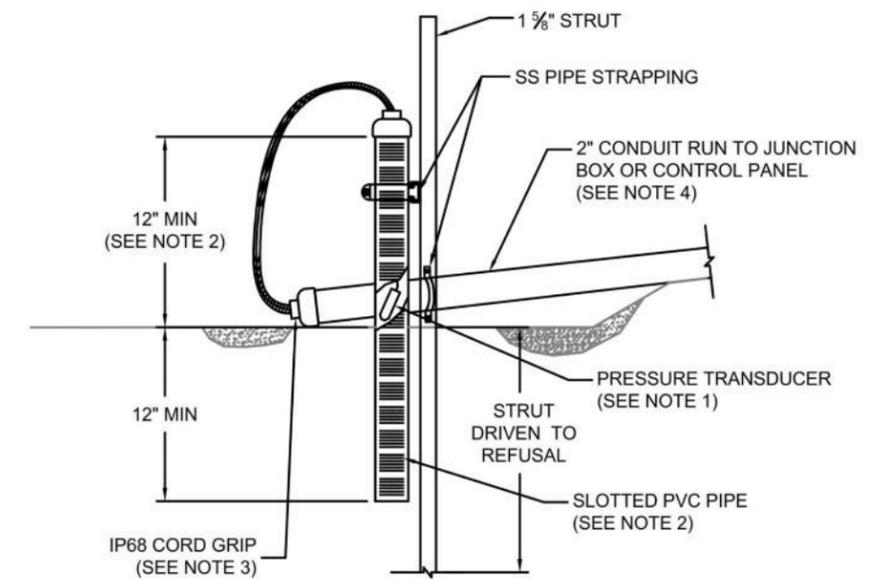
**NOTES:**

- ACTUATED BUTTERFLY VALVE, STEM EXTENSION, FLANGED PIPE AND RUBBER GASKET AVAILABLE THROUGH PARTNERING VALVE DISTRIBUTOR AND FABRICATION SHOP. VALVE SHOULD REST ON OUTER STRUCTURE FLOOR OR BE SUPPORTED BY POURED CONCRETE PAD.
- ALL HARDWARE TO BE #304 SS. SECURE CONDUIT TO SIDEWALL OF CONTROL STRUCTURE WITH #304 SS CLIPS (3' SPACING MAXIMUM).
- CONDUIT BETWEEN JUNCTION BOX AND ACTUATOR IN WATER CONTROL STRUCTURE SHALL BE FLEXIBLE 3/4" THREADED SCHEDULE 40 PVC TO ACCOMMODATE ACTUATOR HOUSING.
- FOLLOW MANUFACTURERS SPECIFICATIONS BUTTERFLY TO FLANGE CONNECTION (SEE TABLE FOR BOLT SIZES). INSTALLATION INSTRUCTIONS AND TORQUE STRENGTH AVAILABLE THROUGH OPTIRTC (PRATT-BF-SERIES-IOM PAGES 6-8).
- ATTACH FLANGE TO WEIR WALL WITH THROUGH BOLTS.

**NOTE:**  
STANDARD DETAILS APPLIES TO ALL THREE FACILITIES

NOT TO SCALE NOT FOR CONSTRUCTION

### GENERIC DETAIL – PRESSURE TRANSDUCER LEVEL SENSOR

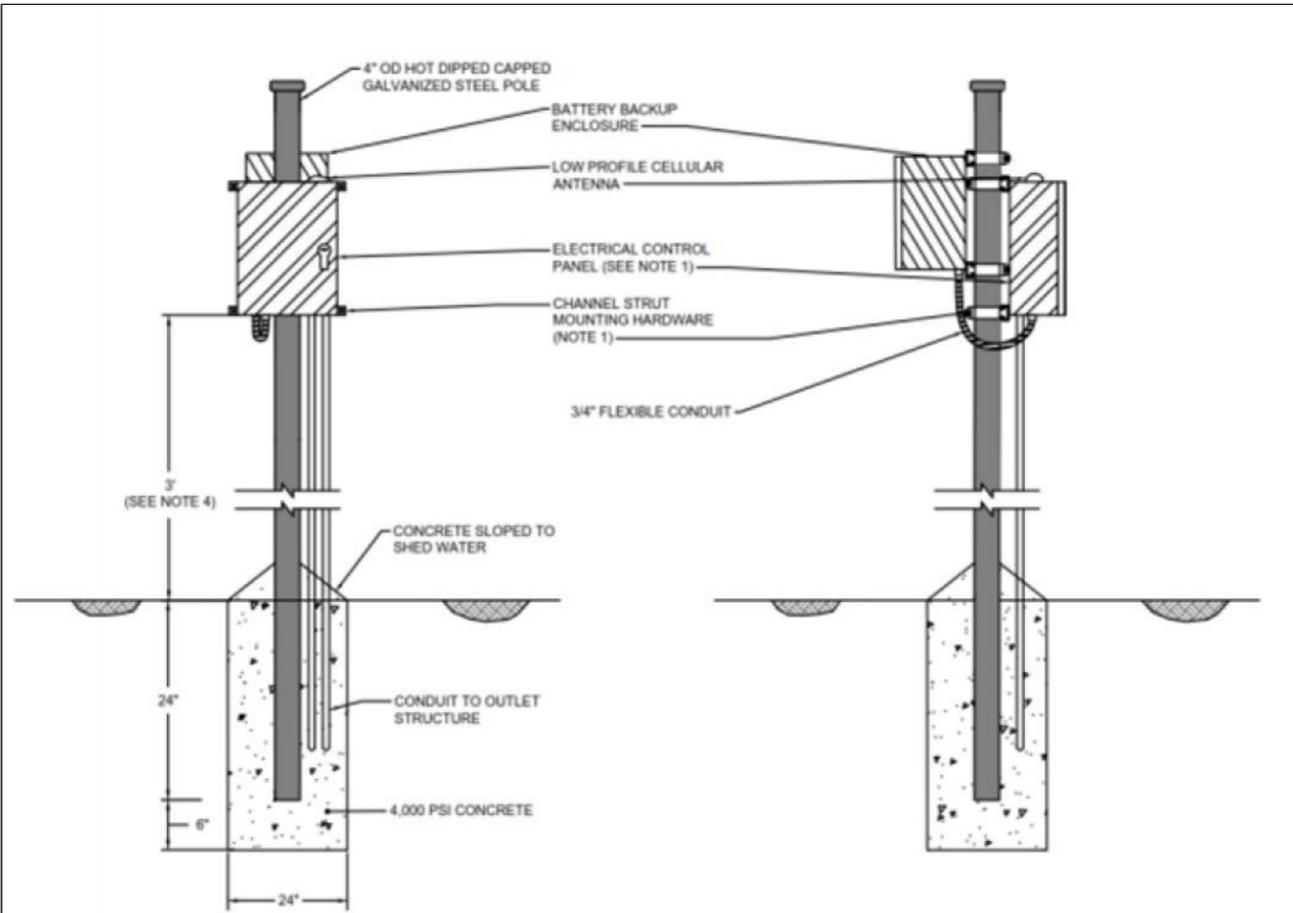


**NOTES:**

- PRESSURE TRANSDUCER INSTALLED WITHIN STILLING WELL WITH SENSOR AT GROUND LEVEL.
- STILLING WELL MADE FROM SLOTTED PVC SCREEN, ALTERNATIVE WELL BY OPTIRTC APPROVAL. SCREENING MUST CONTINUE ABOVE GROUND.
- PENETRATIONS INTO ALL EQUIPMENT MUST BE LIQUID TIGHT. INSTALLATION OF ELECTRICAL COMPONENTS MUST BE IN ACCORDANCE TO OPTIRTC SPECIFICATIONS.
- CONDUIT FLUSH TO GROUND OR INSTALLED IN TRENCH IF SITE WILL BE MOWED.

TITLE: OUTLET STRUCTURE AND SENSOR DETAILS			
PROJECT: CLACKAMAS CMAC			
SITE: SUNNY SIDE, POND A, POND B			
 Opti, Inc. 356 Boylston Street, 2 <sup>nd</sup> Floor Boston, MA 02116		DESIGN BY: AMH	DATE: 10/6/2016
		DRAWN BY: AMH	PROJECT NO.: OP349
		CHECKED BY:	FILE:
		REVIEWED BY:	DRAWING NO.:
		APPROVED BY:	12 OF 16

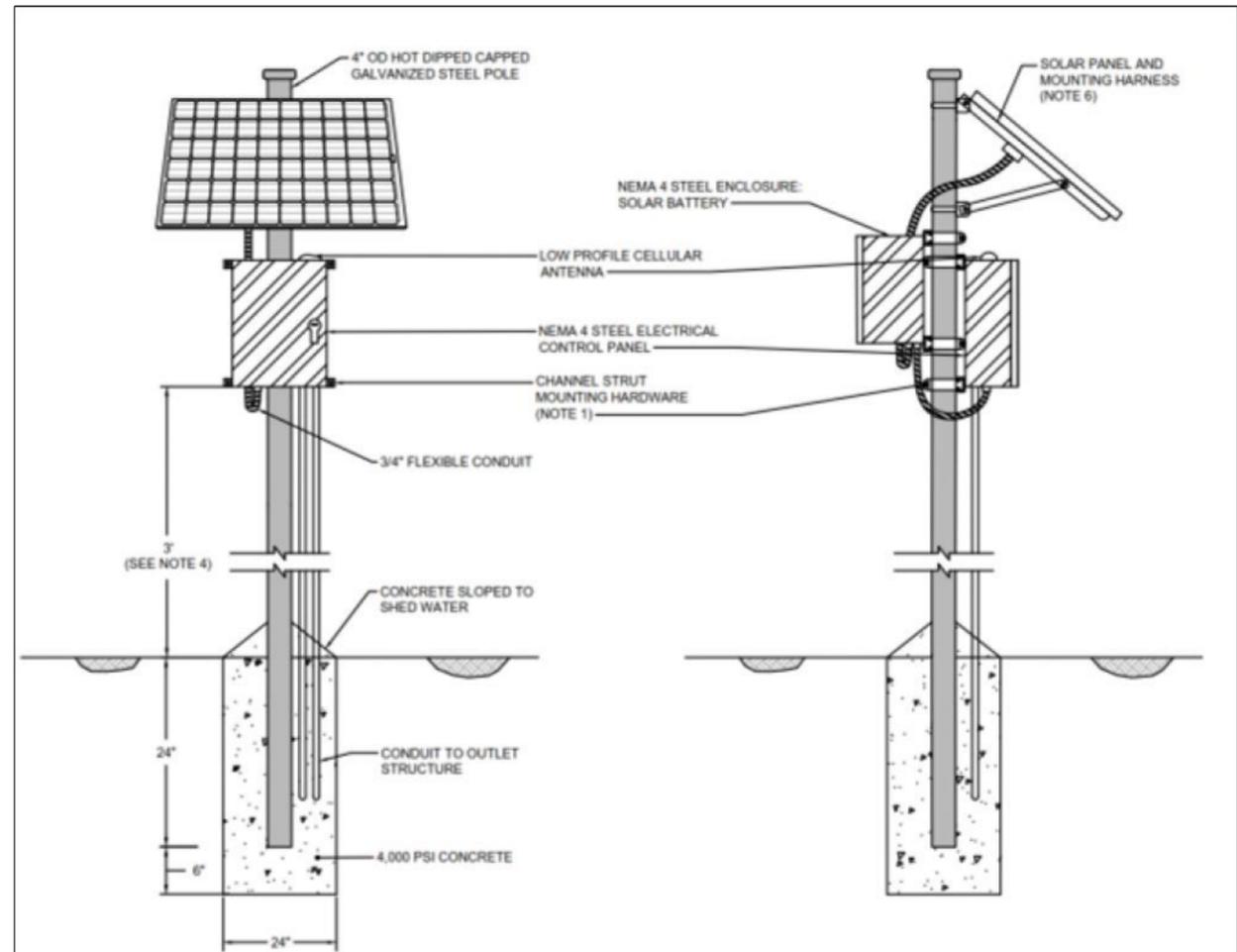
**GENERIC DETAIL – SUPPORT POLE WITH BATTERY BACKUP AND LINE POWER**



**NOTES:**

1. BOLT ENCLOSURE (PROVIDED BY PARTNERING MANUFACTURER ) TO SUPPORT POLE USING STAINLESS STEEL CHANNEL STRUT AND CHANNEL STRUT PIPE CLAMPS (EXAMPLE: UNISTRUT PRODUCT NUMBER P1119).
2. INSTALL "DANGER 120 VOLTS" ADHESIVE BACKED SIGN TO ELECTRICAL ENCLOSURE INTERIOR ON THE SWING PANEL.
3. INSTALL "DANGER ELECTRICAL HAZARD, TURN OFF POWER BEFORE SERVICING" ADHESIVE BACKED SIGN TO ELECTRICAL ENCLOSURE INTERIOR ON THE SWING PANEL.
4. ALL CONDUIT PENETRATIONS ARE TO BE IP68 RATED.
5. BOTH BATTERY AND CONTROL PANEL ENCLOSURES SHOULD BE MOUNTED HIGHER THAN THE EXPECTED HIGH WATER LEVEL.

**GENERIC DETAIL – SUPPORT POLE WITH BATTERY AND SOLAR POWER**



**NOTES:**

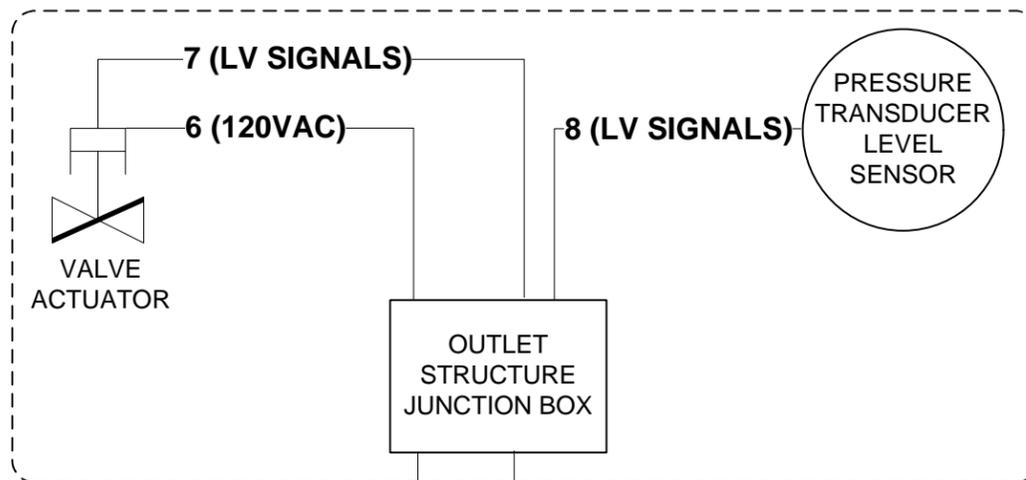
1. BOLT ENCLOSURE TO SUPPORT POLE USING STAINLESS STEEL CHANNEL STRUT AND CHANNEL STRUT PIPE CLAMPS (EXAMPLE: UNISTRUT PRODUCT NUMBER P1119).
2. INSTALL "DANGER 120 VOLTS" ADHESIVE BACKED SIGN TO ELECTRICAL ENCLOSURE INTERIOR ON THE SWING PANEL.
3. INSTALL "DANGER ELECTRICAL HAZARD, TURN OFF POWER BEFORE SERVICING" ADHESIVE BACKED SIGN TO ELECTRICAL ENCLOSURE INTERIOR ON THE SWING PANEL.
4. ALL CONDUIT PENETRATIONS ARE TO BE IP68 RATED.
5. BOTH BATTERY AND CONTROL PANEL ENCLOSURES SHOULD BE MOUNTED HIGHER THAN THE EXPECTED HIGH WATER LEVEL.
6. SOLAR PANEL AND MOUNTING HARNESS FROM AMERESCO SOLAR (EXAMPLE: PART VLS-140T).

**NOTE:  
STANDARD DETAILS APPLIES TO ALL  
THREE FACILITIES**

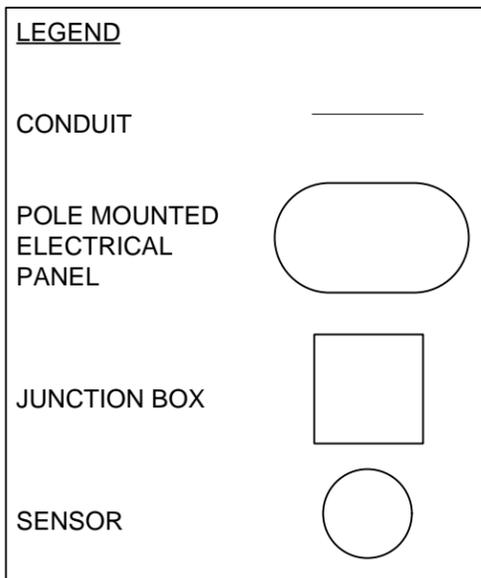
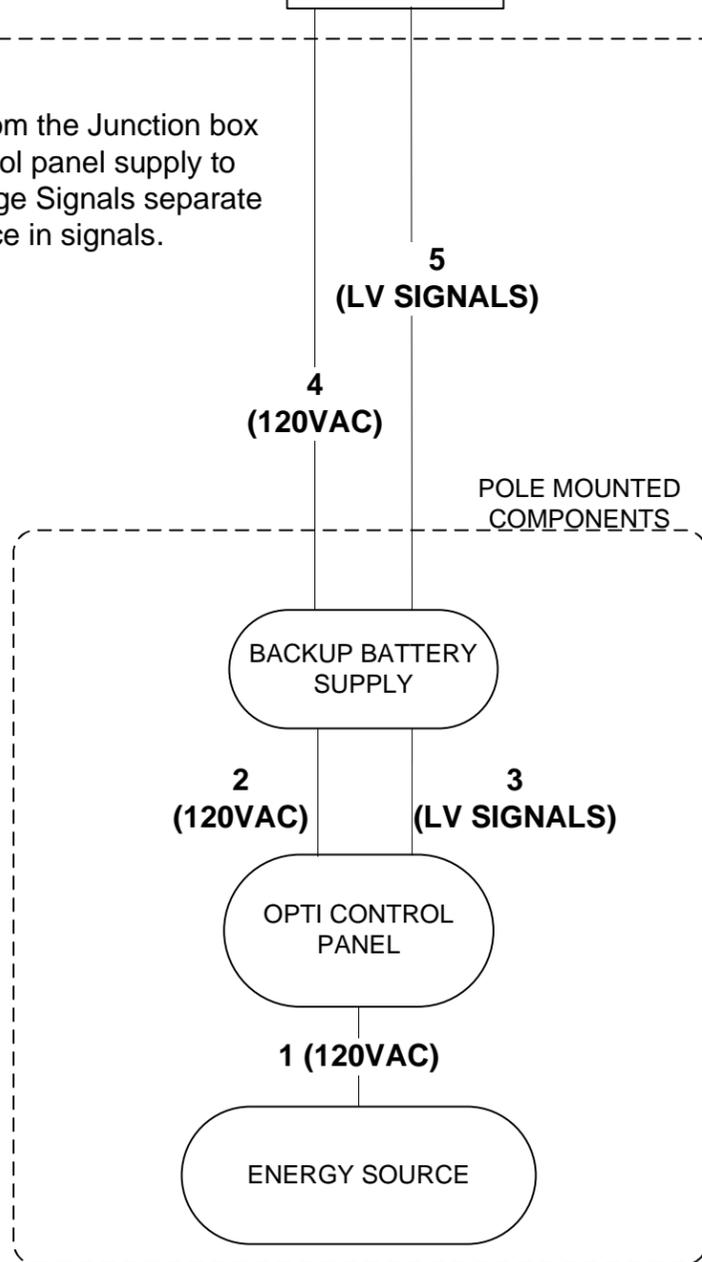
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TITLE: <b>PROPOSED SUPPORT POLE</b>			
PROJECT: <b>CLACKAMAS CMAC</b>			
SITE: <b>SUNNY SIDE, POND A, POND B</b>			
 OptiRTC, Inc. 356 Boylston Street, 2 <sup>nd</sup> Floor Boston, MA 02116	 WATER ENVIRONMENT SERVICES	DESIGN BY: AMH	DATE: 10/6/2016
		DRAWN BY: AMH	PROJECT NO.: OP349
		CHECKED BY:	FILE:
		REVIEWED BY:	DRAWING NO.:
		APPROVED BY:	<b>13</b> OF <b>16</b>

OUTLET STRUCTURE COMPONENTS



There will be two conduit runs from the Junction box to the backup battery and control panel supply to keep the 120VAC and Low Voltage Signals separate in order to limit interference in signals.



NOT TO SCALE

**NOTE:**  
STANDARD DETAILS APPLIES TO **SUNNY SIDE AND POND B**

CONDUIT IDENTIFICATION TABLE			
CONDUIT ID (FROM DIAGRAM)	CONDUIT TERMINATION POINTS	APPROX CONDUIT LENGTH	WIRE MINIMUM GAUGE
1	LINE POWER CONNECTION FROM POWER DROP - OPTI CONTROL PANEL	225 FT	16 AWG
2	OPTI CONTROL PANEL - BATTERY BACKUP (120VAC)	5 FT	16 AWG
3	OPTI CONTROL PANEL - BATTERY BACKUP (LOW VOLTAGE SIGNALS)	5 FT	16 AWG
4	BATTERY BACKUP - OUTLET STRUCTURE JUNCTION BOX (120VAC)	15 FT	16 AWG
5	BATTERY BACKUP - OUTLET STRUCTURE JUNCTION BOX (LOW VOLTAGE SIGNALS)	15 FT	16 AWG
6	OUTLET STRUCTURE JUNCTION BOX - ACTUATED VALVE (120VAC)	5 FT	16 AWG
7	OUTLET STRUCTURE JUNCTION BOX - ACTUATED VALVE (LOW VOLTAGE SIGNALS)	5 FT	16 AWG
8	OUTLET STRUCTURE JUNCTION BOX - PRESSURE TRANSDUCER (LOW VOLTAGE SIGNALS)	10 FT	16 AWG

**NOTE:**

CONDUIT	6	RUNS THROUGH	4,2
CONDUITS	7,8	RUN THROUGH	5,3

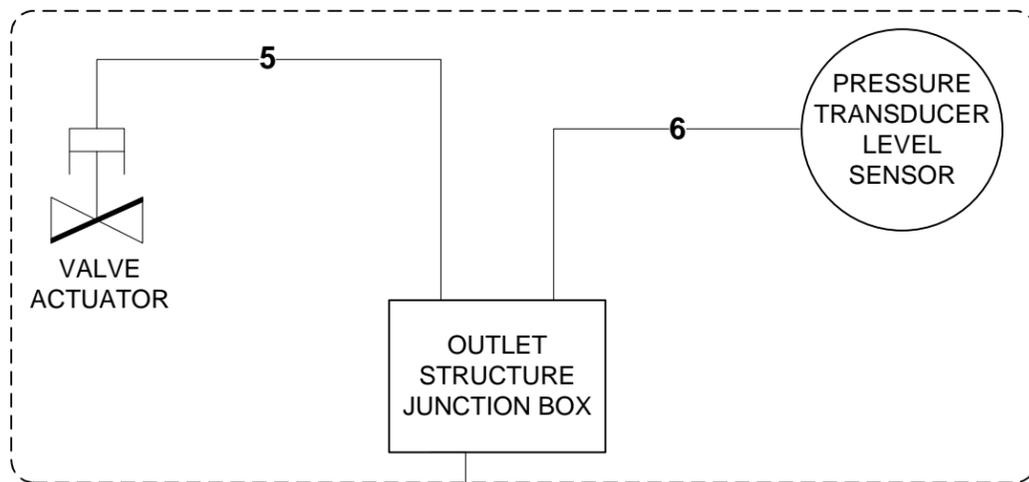
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TITLE: ELECTRICAL CONDUIT SCHEDULE - SUNNY SIDE AND POND B			
PROJECT: CLACKAMAS CMAC			
SITE: SUNNY SIDE, POND A, POND B			
	DESIGN BY: AMH	DATE: 10/6/2016	
	DRAWN BY: AMH	PROJECT NO.: OP349	
	CHECKED BY:	FILE:	
	REVIEWED BY:	DRAWING NO.:	
	APPROVED BY:		<b>14</b> OF <b>16</b>

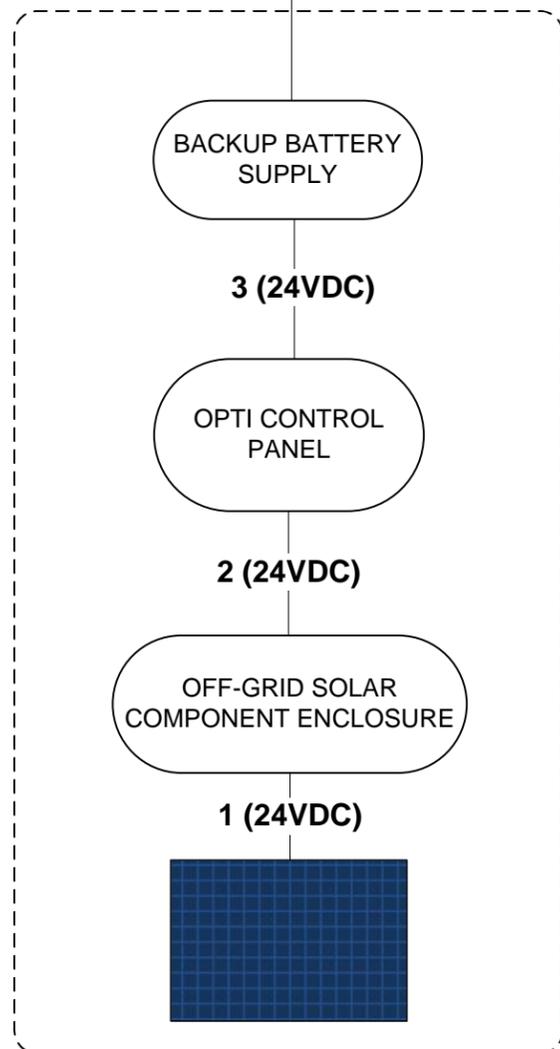
OptiRTC, Inc.  
356 Boylston Street, 2<sup>nd</sup> Floor  
Boston, MA 02116



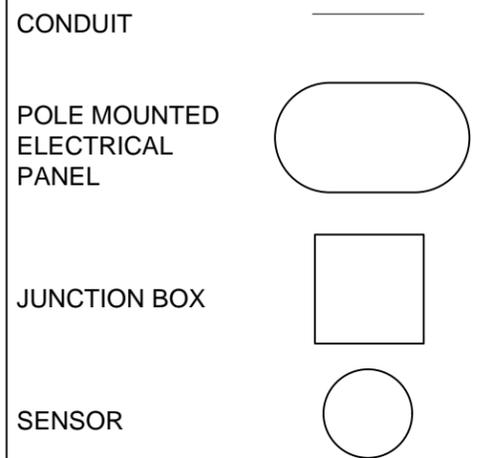
OUTLET STRUCTURE COMPONENTS



4 (24VDC) POLE MOUNTED COMPONENTS



LEGEND



NOT TO SCALE

CONDUIT IDENTIFICATION TABLE

CONDUIT ID (FROM DIAGRAM)	CONDUIT TERMINATION POINTS	APPROX CONDUIT LENGTH	MINIMUM GAUGE
1	SOLAR PANEL - OFF GRID SOLAR COMPONENT ENCLOSURE (12VDC)	5 FT	16 AWG
2	OFF GRID SOLAR COMPONENT ENCLOSURE - OPTI CONTROL PANEL (12VDC)	5 FT	16 AWG
3	OPTI CONTROL PANEL - BATTERY BACKUP (12VDC)	5 FT	16 AWG
4	BATTERY BACKUP - OUTLET STRUCTURE JUNCTION BOX (12VDC)	20 FT	16 AWG
5	OUTLET STRUCTURE JUNCTION BOX - ACTUATED VALVE (12VDC)	5 FT	16 AWG
6	OUTLET STRUCTURE JUNCTION BOX - PRESSURE TRANSDUCER (12VDC)	30 FT	16 AWG

NOTE:

CONDUITS	5,6	RUN THROUGH	4,3
CABLE	5	PROVIDED LENGTH	25 FT
CABLE	6	PROVIDED LENGTH	40 FT

NOTE: STANDARD DETAILS APPLIES TO POND A ONLY

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TITLE:	ELECTRICAL CONDUIT SCHEDULE - POND A		
PROJECT:	CLACKAMAS CMAC		
SITE:	SUNNY SIDE, POND A, POND B		
DESIGN BY:	AMH	DATE:	10/6/2016
DRAWN BY:	AMH	PROJECT NO.:	OP349
CHECKED BY:		FILE:	
REVIEWED BY:		DRAWING NO.:	15 OF 16
APPROVED BY:			



OptiRTC, Inc.  
356 Boylston Street, 2<sup>nd</sup> Floor  
Boston, MA 02116



DESIGN BY:	AMH	DATE:	10/6/2016
DRAWN BY:	AMH	PROJECT NO.:	OP349
CHECKED BY:		FILE:	
REVIEWED BY:		DRAWING NO.:	15 OF 16
APPROVED BY:			

MATERIAL	MATERIAL DESCRIPTION	INCLUDES	QUANTITY	LOCATION
KELLER LEVELGAGE	They will come with 40ft of cable, and a pressure range of 0-20ft H2O. They will be vented and come with a bellows to prevent moisture in the vent tube. The bellos shall be placed in the control panel.	<ul style="list-style-type: none"> <li>•Sensor,</li> <li>•40 ft cable,</li> <li>•Bellows</li> <li>•Weights</li> </ul>	3	Sunny Side, Pond A, Pond B
OPTI CONTROL PANEL	Dimensions are 22" x 18" x 9". The Opti Control Panel includes a cellular modem, telemetry equipment and terminal blocks for connection to, interpreting, and transmitting sensor and control data to Opti. All conduits and conductors are to terminate at the Opti control panel.	<ul style="list-style-type: none"> <li>•Control Panel</li> <li>•Terminals for Sensor and Actuator Connections</li> </ul>	3	Sunny Side, Pond A, Pond B
AMERESCO SOLAR PACKAGE	190W Ameresco solar panel package, including PV panel, mounting bracket, battery, charge controller, and stainless steel enclosure. All components shall be mounted to the installed mounting poles, with the PV panel south facing.	<ul style="list-style-type: none"> <li>•PV Panel</li> <li>•Mounting Bracket</li> <li>•Battery</li> <li>•Charge Controller</li> <li>•Stainless Steel Controller</li> <li>•Wire for PV Panel to Charge Controller</li> </ul>	1	Pond A
PROMATION ACTUATOR WITH PRATT BUTTERFLY VALVE	Promation actuators with connected to a Pratt Butterfly valve with an extended stem (1 for each pond). Model number is P/N BF2-120-8998/P4-120PN4-PBU. Included with each valve is a ANSI 150 slip on flanges welded to a 6" carbon steel pipe for ease of install to weir wall.	<p>Assembled:</p> <ul style="list-style-type: none"> <li>•Promation Actuator, 25 ft cable</li> <li>•Pratt Butterfly Valve</li> <li>•Actuator Stem</li> </ul> <p>Additions:</p> <ul style="list-style-type: none"> <li>•ANSI 150 slip on flanges welded to a 6" carbon steel pipe</li> <li>•Battery Backup</li> </ul>	3	Sunny Side, Pond A, Pond B

TITLE: MATERIALS PROCURED BY OPTI			
PROJECT: CLACKAMAS CMAC			
SITE: SUNNY SIDE, POND A, POND B			
 OptiRTC, Inc. 356 Boylston Street, 2 <sup>nd</sup> Floor Boston, MA 02116		DESIGN BY: AMH	DATE: 10/6/2016
		DRAWN BY: AMH	PROJECT NO.: OP349
		CHECKED BY:	FILE:
		REVIEWED BY:	DRAWING NO.:
		APPROVED BY:	<b>16</b> OF <b>16</b>

NOT TO SCALE NOT FOR CONSTRUCTION

# PRATT

Henry Pratt Company

## **BF Series Wafer/Lug Butterfly Valves**



**Engineering Creative Solutions  
for Fluid Systems Since 1901**

## A Tradition of Excellence

With the development of the first rubber seated butterfly valve more than 70 years ago, the Henry Pratt Company became a trusted name in the flow control industry, setting the standard for product quality and customer service. Today Pratt provides the following range of superior products to the water, wastewater and power generation industries.

**Butterfly Valves:** from 3" to 162"

**Rectangular Valves:** 1' x 1' to 14' x 16'

### Ball Valves –

**Rubber Seated:** from 4" to 60"

**Metal Seated:** from 6" to 48"

**Plug Valves:** from 1/2" to 72", 100% port available up to 48", 3 ways

**Air Valves for Water and Wastewater:** from 1/2" to 20"

## Hydraulic Control Systems

### Valve Controls

### Energy Dissipating Valves and Fixed Energy Dissipaters

### Cone Valves

### Check Valves

### Plunger Valves

## A Commitment to Meeting The Customers' Needs

Henry Pratt valves represent a long-term commitment to both the customer and to a tradition of product excellence. This commitment is evident in the number of innovations we have brought to the industries we serve. In fact, the Henry Pratt Company was the first to introduce many of the flow control products in use today, including the first rubber seated butterfly valve, one of the first nuclear N-Stamp valves, and the bonded seat butterfly valve.

## Innovative Products For Unique Applications

Though many of the standard valves we produce are used in water filtration and distribution applications, Pratt has built a reputation on the ability to develop specialized products that help customers to meet their individual operational challenges.

## Creative Engineering for Fluid Systems

Pratt's ability to provide practical solutions to complex issues is demonstrated by the following case histories.

### Earthquake Proof Valves

Pratt designed and manufactured hydraulically actuated valves for a water storage application so that the valves would automatically operate in the event of earthquakes. This led to the development of a valve that will withstand acceleration forces of up to 6gs.

### Custom Actuation/Isolation Valves

Pratt has designed and manufactured nuclear quality quarter-turn valves and parts since the first nuclear-powered generating plants were built. Our custom valves are able to close in a millisecond, using specially designed Pratt electro-pneumatic actuators.

### Valves Designed for Harsh Environments

Pratt designed and manufactured a 144" diameter butterfly valve for the emergency cooling system at a jet engine test facility. The valve was designed to supply water to help dissipate the tremendous heat generated by the engines during testing.



**PRATT**  
Henry Pratt Company

**Through experience, commitment and creative engineering, Pratt is uniquely suited to provide superior products for our customers' special needs. For more information, contact our corporate headquarters in Aurora, Illinois.**

## Table of Contents

### BF Series Butterfly Valves – 2" to 48"

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Suggested Specification .....	4
CV Flow Data .....	5
Dimensional Data - Wafer.....	6-7
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# Construction Specification: Pratt BF Series Butterfly Valves



Valve with Electric Operator



Valve with Gear Operator

**Sizes:** 2" through 48"

**Body:** Ductile Iron (65-45-12)

**Disc:** Ductile Iron Nickel Plated, Ductile Iron Nylon 11,  
CF8M Stainless Steel, Aluminum Bronze

**Stem:** 416 S.S. Heat Treated

**Resilient Seat:** EPDM, Buna-N, Viton

**Actuation Options:** Worm Gear, Lever,  
Pneumatic, Electric

**Pressure Ratings:** 2" – 12" 230psi  
14" – 48" 150psi

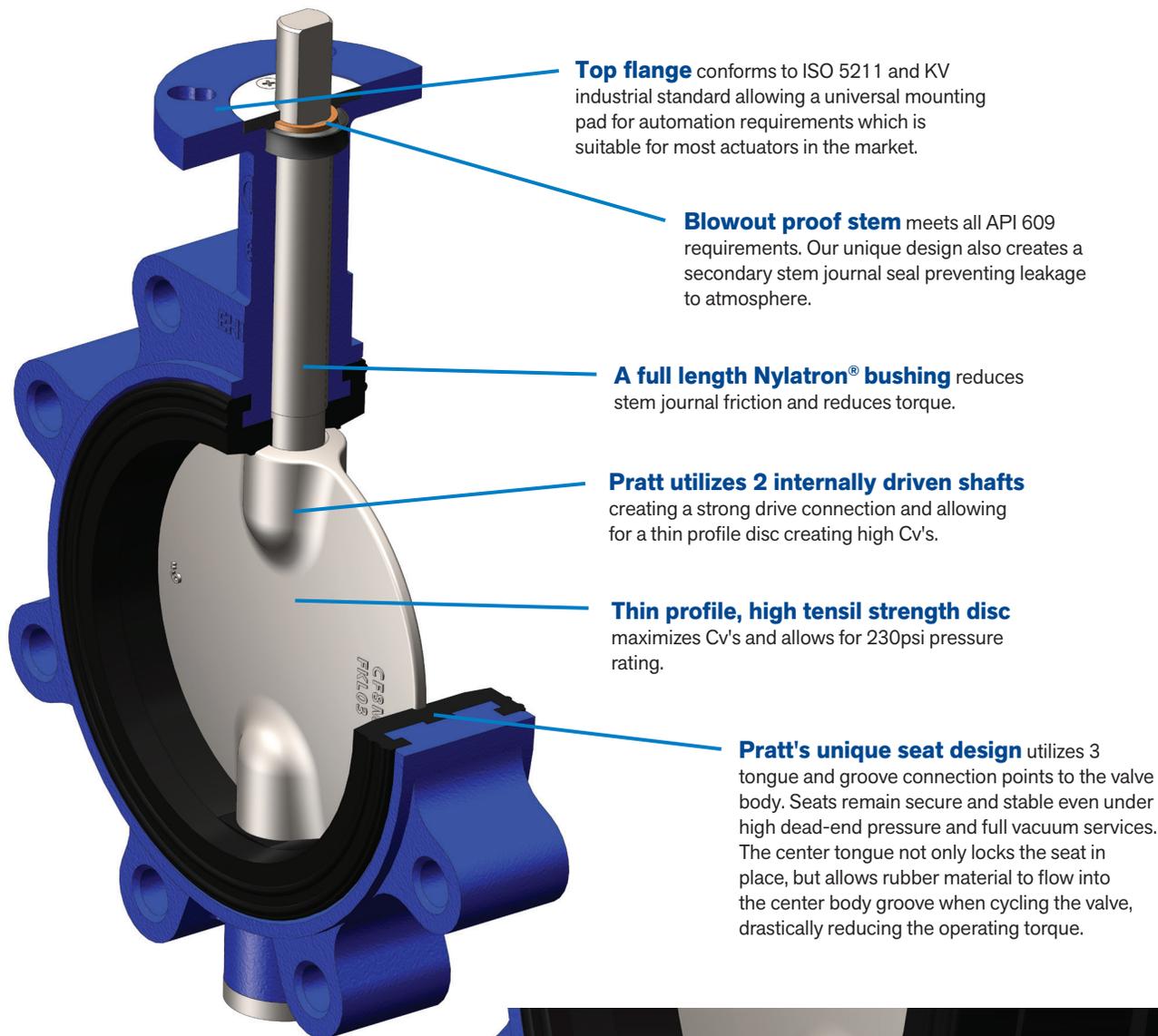
\* For installation between ANSI 125/150

\*\* Substitute material may result in pressure  
rating change. Contact factory for details.

## Features:

- Innovative 3 point connection, tongue and groove seat allows for higher pressure rating and full Vacuum service
- Unique secondary shaft seals prevent leakage from shaft.
- Our two piece shaft design provides maximum strength and a high flow characteristic disc.

# Pratt BF Series Butterfly Valve Design Details: Butterfly Valve, sizes 2" through 48" 2"-12" 230psi, 14"-48" 150psi



**Top flange** conforms to ISO 5211 and KV industrial standard allowing a universal mounting pad for automation requirements which is suitable for most actuators in the market.

**Blowout proof stem** meets all API 609 requirements. Our unique design also creates a secondary stem journal seal preventing leakage to atmosphere.

**A full length Nylatron® bushing** reduces stem journal friction and reduces torque.

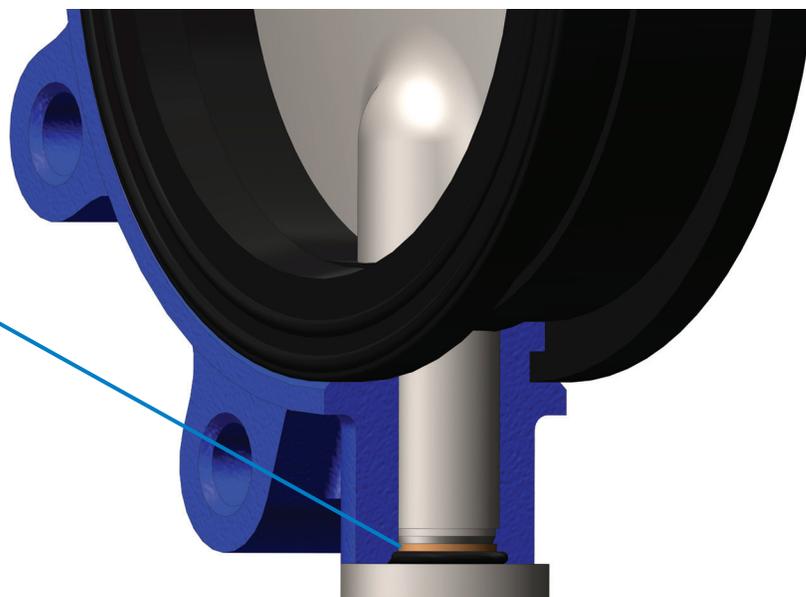
**Pratt utilizes 2 internally driven shafts** creating a strong drive connection and allowing for a thin profile disc creating high Cv's.

**Thin profile, high tensile strength disc** maximizes Cv's and allows for 230psi pressure rating.

**Pratt's unique seat design** utilizes 3 tongue and groove connection points to the valve body. Seats remain secure and stable even under high dead-end pressure and full vacuum services. The center tongue not only locks the seat in place, but allows rubber material to flow into the center body groove when cycling the valve, drastically reducing the operating torque.

**Pratt's BF Series bottom cap** provides lower stem retention and also creates a secondary stem journal seal preventing external leakage to atmosphere. 2"-12" lower shafts ride on a precision wear guide reducing shaft drag.

14" and larger utilizes an axial bearing to support the weight of the shaft and disc, providing a close to friction-free movement.



# Suggested Specifications: Pratt BF Series Wafer/Lug Butterfly Valve, Sizes 2" through 48" 2"-12" 230psi, 14"-48" 150psi

## General

Valves shall be of the Wafer or Lug design for installation between ANSI 125/150 flanges. All valves shall be capable of bi-directional, end of line, bubble tight service to rated pressure. Valves are also rated to full vacuum service. Design Standards: API 608 category A.

## Pressure Rating

2" – 12" – 230psi to fit between ANSI 125/150 flanges

14" – 48" – 150psi to fit between ANSI 125/250 flanges

## Body

Valve body shall be a 1 piece Ductile Iron ASTM A-536 (65-45-12) construction with a laying length conforming to the latest revision of ISO 5752 and a flange connection B16.1/B16.5.

## Disc

Valve disc shall be Ductile iron ASTM A-536 Grade 65-45-12 with ENP plating or Nylon 11 coating, CF8M Stainless Steel, or Aluminum Bronze. Disc shall be designed to accommodate an upper and lower shaft with a thin center profile giving higher Cv values combined with strength.

## Shaft

Valve shaft shall be constructed of Heat Treated 416 Stainless Steel. Valve shall be designed to accommodate (2) shafts (1 upper and 1 lower). The upper shaft shall have a positive engagement in the disc utilizing an internal square drive and shall be retained by the body Top Cap and End Cap.

## Seat

Seat shall be EPDM, Buna-N or Viton. Seat design shall consist of 3 Tongues (2 located on the side walls and 1 located in the center bore) that engage into 3 grooves in the body. These 3 tongue and groove connection points prevent seat movement in a radial and axial direction. Seats shall be field replaceable.

## Shaft Seals

Upper Shaft Seal shall be self-adjusting V-type and shall be suitable for Pressure or Vacuum service. Packing shall be located above the bushing and shall create a positive seal against the Top Cap. Bottom end cap contains a captive o-ring creating a positive seal against external leakage.

## Bushings

Valve shall consist of (2) full length Nylatron® bushings (upper and lower) offering superior protection against friction, corrosion and impacts. Pratt's unique bushings design provide protection against shaft side loading.

## Testing

All valves shall be leak tested in the factory at their rated pressure per API 598.

# CV Flow Data: BF Series BFV

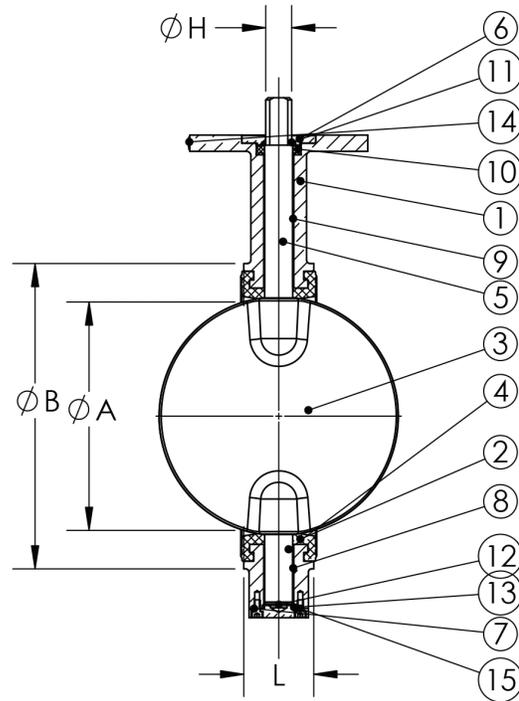
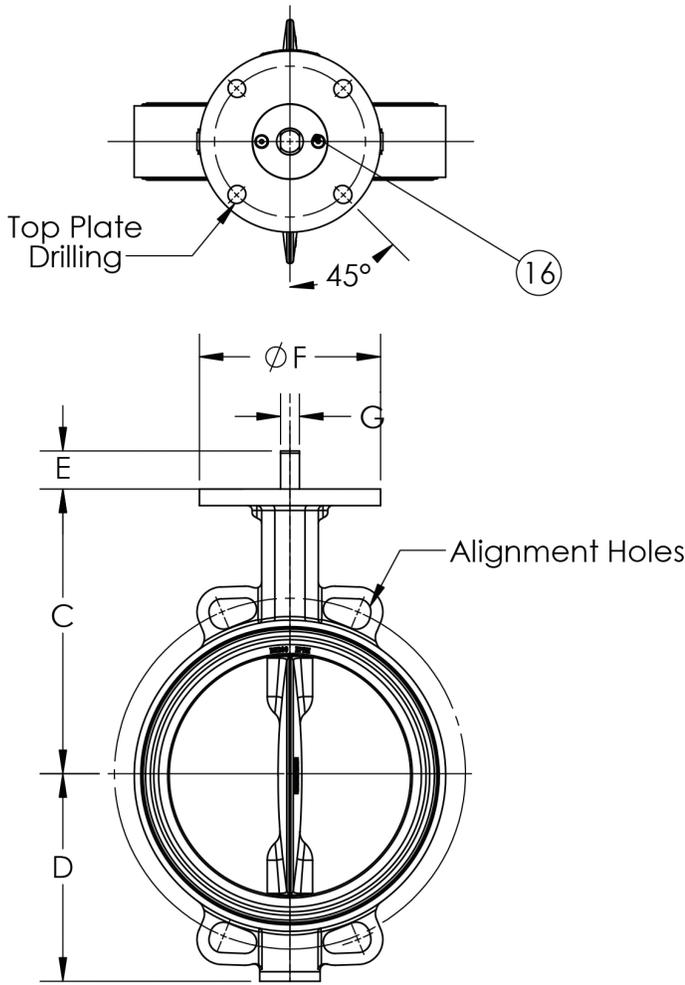
During its product development phase, the BF Series Wafer/Lug Butterfly Valve was tested to ensure that it met our own rigorous standards for flow capacity. Throughout testing, the BF Series valve has consistently produced high Cv values which translates to lower flow resistance, and in turn, lowering system operating costs to the user over the life of the valve. The following Cv chart represents the flow characteristics for all sizes available.

Valve Opening (deg)	Cv by Valve Size													
	2"	2.5"	3"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	24"
10	1	2	3.5	6	8.5	14	18	28.1	40.5	55.1	72	91.1	112.5	162
20	1.8	2.9	4.1	7.4	11.5	16.5	29.4	185.5	267.1	363.6	474.9	601.1	742.1	1069
30	10.8	16.9	24.3	43.2	67.5	97.1	172.7	381.5	549.4	747.8	976.7	1236	1526	2198
40	22.1	34.5	49.7	88.4	138.1	198.8	353.4	683.1	983.6	1339	1749	2213	2732	3935
50	38.5	60.2	86.7	154.2	240.9	346.9	616.8	1161	1671	2275	2971	3761	4643	6685
60	65.3	102	146.9	261.1	408	587.6	1045	1944	2799	3810	4976	6298	7775	11196
70	111	173.5	249.8	444.1	693.9	999.2	1776	3232	4654	6335	8274	10472	12928	18617
80	176.2	275.2	396.3	704.6	1101	1585	2818	6215	8950	12182	15911	20138	24862	35801
90	206.4	322.5	464.4	825.6	1290	1858	3302	6420	9245	12583	16435	20801	25680	36979

**BF Series Wafer / Lug Butterfly Valves being tested at an independent research laboratory**

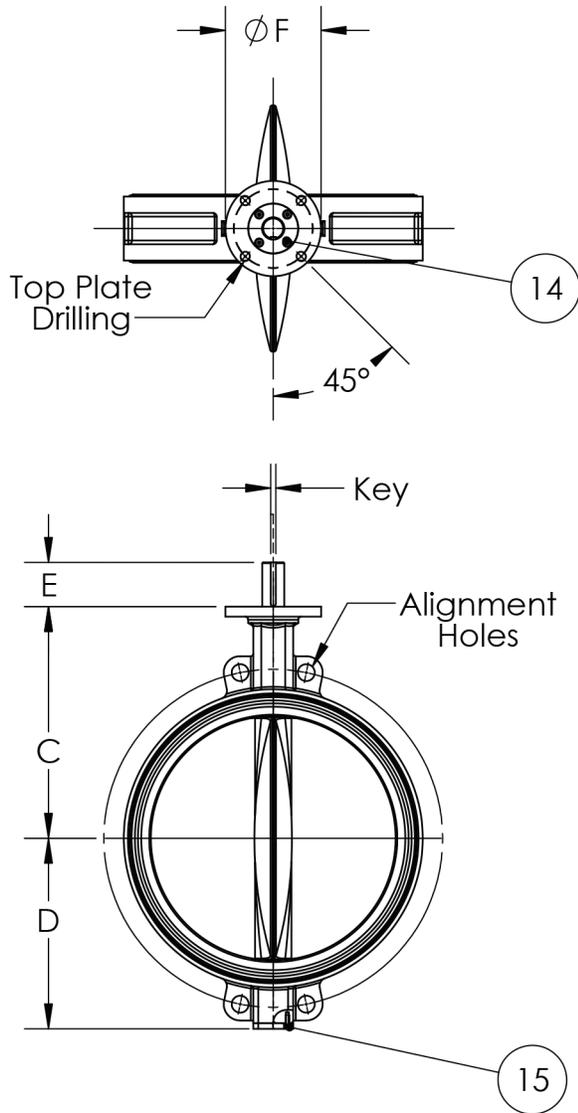


# Dimensional Data: BF Series BFV, Wafer

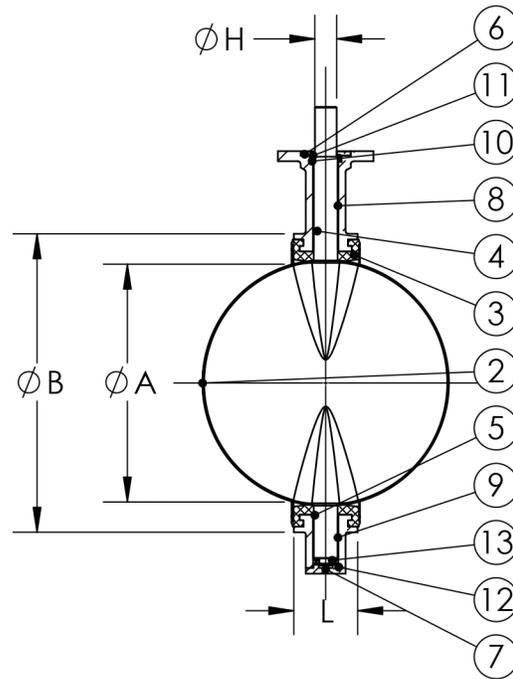


Part No.	Part Name	Material	Qty.
1	Wafer Body	DI	1
2	Seat	EPDM/NBR/Viton	1
3	Disc	SS316/DI/C954/Nylon 11	1
4	Lower Stem	SS416/SS316/SS630	1
5	Upper Stem	SS416/SS316/SS630	1
6	Top Cap	1020 Steel	1
7	End Cap	1020 Steel	1
8	Lower Bushing	Nylatron®	1
9	Upper Bushing	Nylatron®	1
10	V-packing	NBR	1
11	Washer	SS304	1
12	Wear Shim	SS304	1
13	O-ring	NBR	1
14	Data Plate	SS304	1
15	End Cap Bolt	SS304	2
16	Top Cap Bolt	SS304	2

Size	lbs	Pratt Standard Top Plate Drilling										ISO 5211 Top Plate Drilling			Alignment Holes					
		ΦA	ΦB	C	D	E	ΦF	G	ΦH	L	Key	Bolt Circle	No. of Holes	Hole Dia.	Bolt Circle	No. of Holes	Hole Dia.	Bolt Circle	No. of Holes	Hole Dia.
2"	5.51	1.079	3.500	5.000	2.579	1.260	4.000	0.375	0.563	1.693	-	3.25	4	0.437	2.760	4	0.402	4.75	4	0.75
2.5"	6.39	1.862	4.094	5.500	2.854	1.260	4.000	0.375	0.563	1.811	-	3.25	4	0.437	2.760	4	0.402	5.5	4	0.75
3"	7.49	2.429	4.646	5.709	3.642	1.260	4.000	0.375	0.563	1.811	-	3.25	4	0.437	2.760	4	0.402	6	4	0.75
4"	10.58	3.500	5.827	6.496	4.429	1.260	4.000	0.437	0.625	2.047	-	3.25	4	0.437	2.760	4	0.402	7.5	4	0.75
5"	15.65	4.567	7.205	7.500	4.921	1.260	4.000	0.500	0.750	2.205	-	3.25	4	0.437	2.760	4	0.402	8.5	4	0.88
6"	17.63	5.433	7.992	7.874	5.433	1.260	4.000	0.500	0.750	2.205	-	3.25	4	0.437	2.760	4	0.402	9.5	4	0.88
8"	31.52	7.744	10.315	9.500	6.811	1.260	6.000	0.625	0.875	2.362	-	5	4	0.563	4.921	4	0.563	11.75	4	0.88
10"	50.03	9.646	12.598	10.866	8.110	2.000	6.000	-	1.125	2.677	1/4" * 1/4"	5	4	0.563	4.921	4	0.563	14.25	4	1
12"	67.00	11.339	14.567	12.205	9.713	2.000	6.000	-	1.125	3.071	1/4" * 1/4"	5	4	0.563	4.921	4	0.563	17	4	1



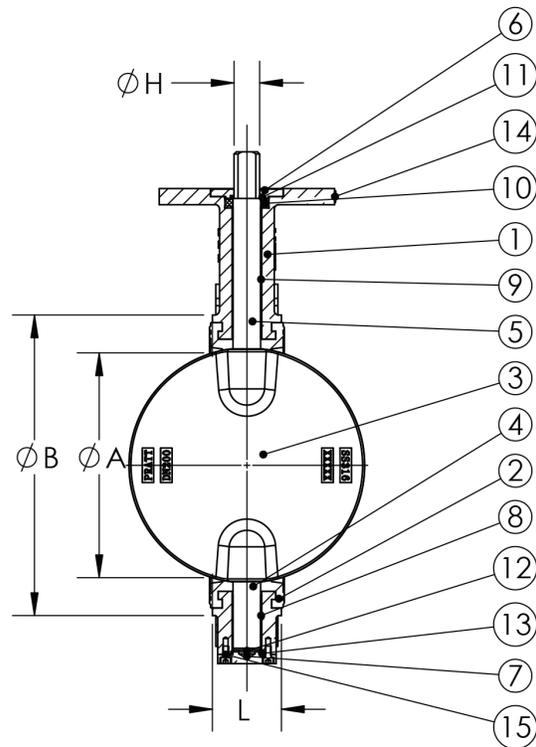
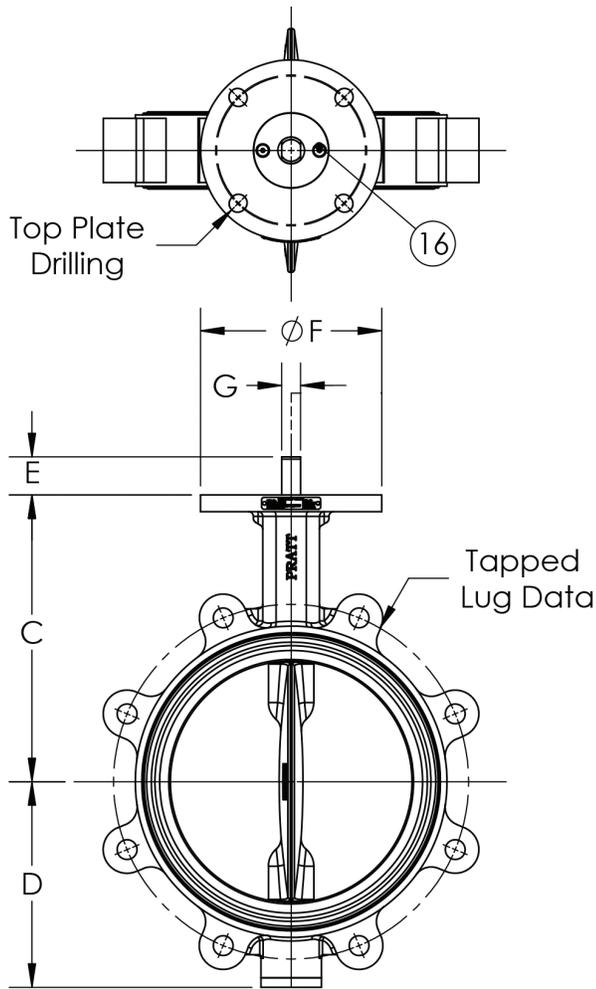
SECTION B-B



Part No.	Part Name	Material	Qty.
1	Wafer Body	DI	1
2	Disc	SS316/DI/C954/Nylon 11	1
3	Seat	EPDM/NBR/Viton	1
4	Upper Stem	SS416/SS316/SS630	1
5	Lower Stem	SS416/SS316/SS630	1
6	Top Cap	1020 Steel	1
7	End Cap	1020 Steel	1
8	Upper Bushing	Nylatron®	1
9	Lower Bushing	Nylatron®	1
10	V-packing	NBR	1
11	Washer	SS304	1
12	O-ring	NBR	1
13	Bearing	Steel	1
14	Top Cap Bolt	SS304	4
15	End Cap Bolt	SS304	4

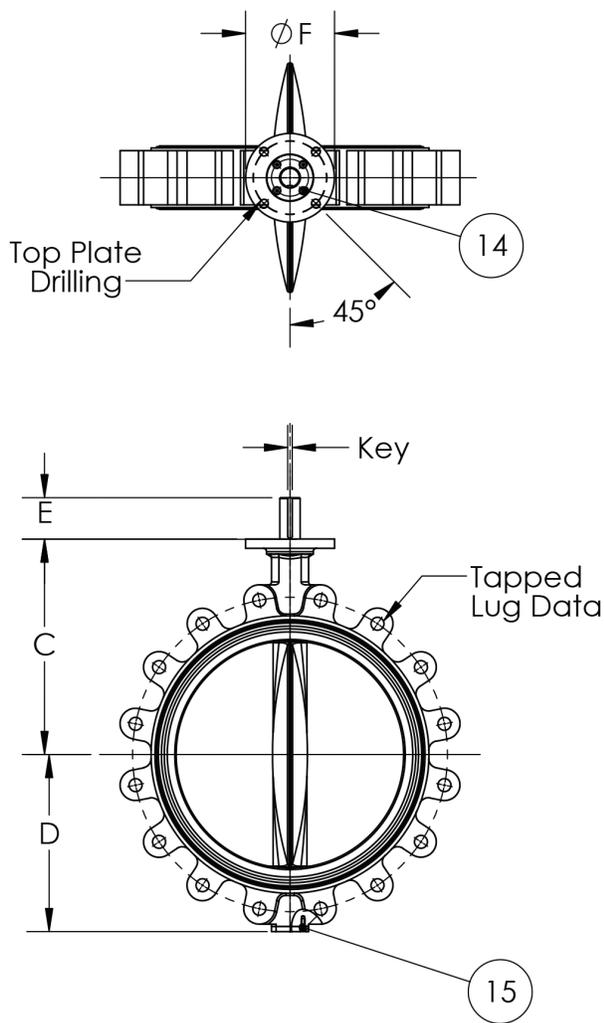
Size	Lbs	$\phi A$	$\phi B$	C	D	E	$\phi F$	$\phi H$	L	Key	Pratt Standard Top Plate Drilling			ISO 5211 Top Plate Drilling			Alignment Holes		
											Bolt Circle	No. of Holes	Hole Dia.	Bolt Circle	No. of Holes	Hole Dia.	Bolt Circle	No. of Holes	Hole Dia.
14"	80.01	12.677	16.772	12.992	10.984	2.760	6.000	1.374	3.071	5/16" * 5/16"	5	4	0.563	4.92	4	0.563	18.75	4	1.122
16"	110.20	14.921	18.748	14.567	11.969	2.760	6.000	1.374	4.016	5/16" * 5/16"	5	4	0.563	4.92	4	0.563	21.25	4	1.122
18"	160.89	16.693	20.945	15.551	13.189	3.000	8.000	1.626	4.488	3/8" * 3/8"	6.5	4	0.811	6.5	4	0.811	22.75	4	1.26
20"	207.18	18.504	23.189	16.850	14.528	3.500	8.000	1.874	5.000	1/2" * 1/2"	6.5	4	0.811	6.5	4	0.811	25	4	1.26
24"	317.38	22.480	27.008	19.685	16.693	3.500	8.000	1.874	6.063	1/2" * 1/2"	6.5	4	0.811	6.5	4	0.811	29.5	4	1.378

# Dimensional Data: BF Series BFV, Lug

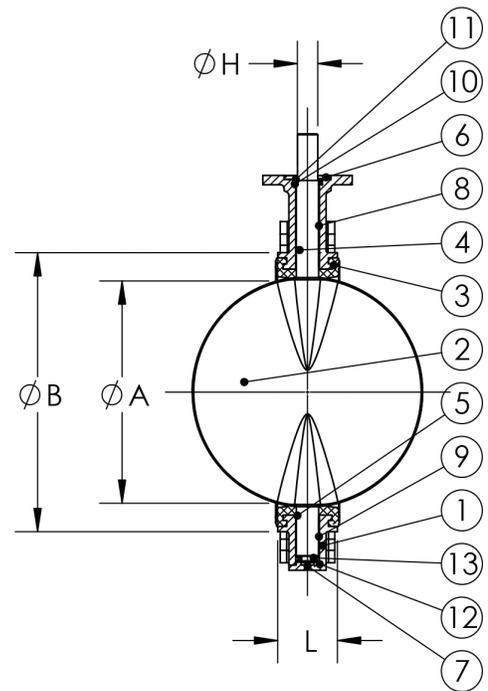


Part No.	Part Name	Material	Qty.
1	Lug Body	DI	1
2	Seat	EPDM/NBR/Viton	1
3	Disc	SS316/DI/C954/Nylon 11	1
4	Lower Stem	SS416/SS316/SS630	1
5	Upper Stem	SS416/SS316/SS630	1
6	Top Cap	1020 Steel	1
7	End Cap	1020 Steel	1
8	Lower Bushing	Nylatron®	1
9	Upper Bushing	Nylatron®	1
10	V-packing	NBR	1
11	Washer	SS304	1
12	Wear Shim	SS304	1
13	O-ring	NBR	1
14	Data Plate	SS304	1
15	End Cap Bolt	SS304	2
16	Top Cap Bolt	SS304	2

Size	Lbs	$\phi A$	$\phi B$	C	D	E	$\phi F$	G	$\phi H$	L	Key	Pratt Standard Top Plate Drilling			ISO 5211 Top Plate Drilling			Tapped Lug Data		
												Bolt Circle	No. of Holes	Hole Dia.	Bolt Circle	No. of Holes	Hole Dia.	Bolt Circle	No. of Holes	Tapped
2"	7.05	1.079	3.500	5.000	2.579	1.260	4.000	0.375	0.563	1.693	-	3.25	4	0.437	2.760	4	0.402	4.75	4	5/8"
2.5"	8.15	1.862	4.094	5.500	2.854	1.260	4.000	0.375	0.563	1.811	-	3.25	4	0.437	2.760	4	0.402	5.5	4	5/8"
3"	11.24	2.429	4.646	5.709	3.642	1.260	4.000	0.375	0.563	1.811	-	3.25	4	0.437	2.760	4	0.402	6	4	5/8"
4"	14.55	3.500	5.827	6.496	4.429	1.260	4.000	0.437	0.625	2.047	-	3.25	4	0.437	2.760	4	0.402	7.5	8	5/8"
5"	20.72	4.567	7.205	7.500	4.921	1.260	4.000	0.500	0.750	2.205	-	3.25	4	0.437	2.760	4	0.402	8.5	8	3/4"
6"	22.92	5.433	7.992	7.874	5.433	1.260	4.000	0.500	0.750	2.205	-	3.25	4	0.437	2.760	4	0.402	9.5	8	3/4"
8"	38.35	7.744	10.315	9.500	6.811	1.260	6.000	0.625	0.875	2.362	-	5	4	0.563	4.921	4	0.563	11.75	8	3/4"
10"	62.59	9.646	12.598	10.866	8.110	2.000	6.000	-	1.125	2.677	1/4" * 1/4"	5	4	0.563	4.921	4	0.563	14.25	12	7/8"
12"	83.53	11.339	14.567	12.205	9.713	2.000	6.000	-	1.125	3.071	1/4" * 1/4"	5	4	0.563	4.921	4	0.563	17	12	7/8"



SECTION A-A



Part No.	Part Name	Material	Qty.
1	Lug Body	DI	1
2	Disc	SS316/DI/C954/Nylon 11	1
3	Seat	EPDM/NBR/Viton	1
4	Upper Stem	SS416/SS316/SS630	1
5	Lower Stem	SS416/SS316/SS630	1
6	Top Cap	1020 Steel	1
7	End Cap	1020 Steel	1
8	Upper Bushing	Nylatron®	1
9	Lower Bushing	Nylatron®	1
10	V-packing	NBR	1
11	Washer	SS304	1
12	O-ring	NBR	1
13	Bearing	Steel	1
14	Top Cap Bolt	SS304	4
15	End Cap Bolt	SS304	4

Size	Lbs	Pratt Standard Top Plate Drilling			ISO 5211 Top Plate Drilling			Tapped Lug Data											
		$\phi A$	$\phi B$	$\phi F$	Bolt Circle	No. of Holes	Hole Dia.	Bolt Circle	No. of Holes	Hole Dia.	Bolt Circle	No. of Holes	Tapped						
14"	110.20	12.677	16.772	12.992	10.984	2.760	6.000	1.374	3.071	5/16" * 5/16"	5	4	0.563	4.92	4	0.563	18.75	12	1"
16"	160.89	14.921	18.748	14.567	11.969	2.760	6.000	1.374	4.016	5/16" * 5/16"	5	4	0.563	4.92	4	0.563	21.25	16	1"
18"	222.60	16.693	20.945	15.551	13.189	3.000	8.000	1.626	4.488	3/8" * 3/8"	6.5	4	0.811	6.5	4	0.811	22.75	16	1 1/8"
20"	275.50	18.504	23.189	16.850	14.528	3.500	8.000	1.874	5.000	1/2" * 1/2"	6.5	4	0.811	6.5	4	0.811	25	20	1 1/8"
24"	407.74	22.480	27.008	19.685	16.693	3.500	8.000	1.874	6.063	1/2" * 1/2"	6.5	4	0.811	6.5	4	0.811	29.5	20	1 1/4"

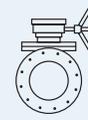
# PRATT PRODUCT GUIDE



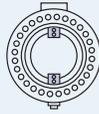
**Model  
2FI**



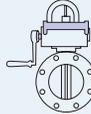
**Monoflange  
MKII**



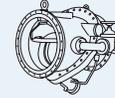
**Plug  
Valve**



**Triton®  
XR70**



**Indicating Butterfly Valve  
UL & FM approved**



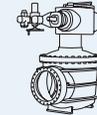
**Tilting Disc  
Check Valve**



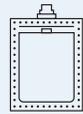
**Triton®  
XL**



**N-Stamp Nuclear  
Butterfly Valve**



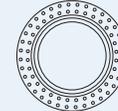
**Cone  
Valve**



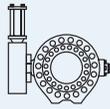
**Rectangular**



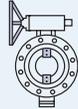
**PIVA Post Indicating Valve Assembly  
UL & FM approved**



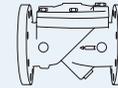
**Sleeve  
Valve**



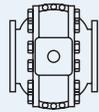
**Rubber Seated  
Ball Valve**



**Triton®  
HP250**



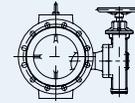
**Check  
Valve**



**Metal Seated  
Ball Valve**

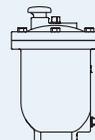


**Control  
Systems**



**Plunger Valve**

**PRATT**



**Air Valve**

**Henry Pratt Company**

401 South Highland Avenue  
Aurora, Illinois 60506-5563 - US  
P: 630-844-4000 F: 630-844-4160  
www.henrypratt.com  
ISO 9001: 2000 Certified



# PROMATION ENGINEERING

Precision Actuation for Industry  
*...Partners, Above and Beyond*

Data Sheet

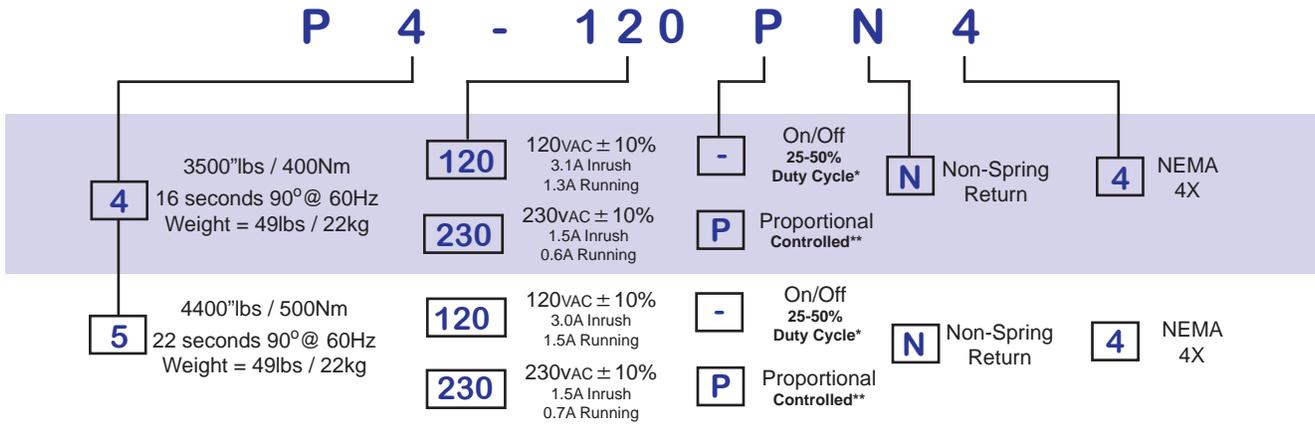
## P4/5 HV AC Series

On/Off/Jog/Proportional  
 ISO5211 F10 8P35

Actuator Specifications	P4		P5	
	3500"lbs / 400Nm		4400"lbs / 500Nm	
Torque lb/Nm	3500"lbs / 400Nm		4400"lbs / 500Nm	
Supply Voltage	120vac	230vac	120vac	230vac
Max Inrush Current	3.1A	1.5A	3.0A	1.5A
Running Current	1.3A	0.6A	1.5A	0.7A
Runtime (90°@60/50Hz)	16sec/18sec		22sec/25sec	
Weight	49lbs/22kg			
Mechanical Connections	ISO5211 F10 8 pt 35mm			
Electrical Entry	(2) 3/4" NPT			
Electrical Terminations	12 - 18 Ga.			
Environmental Rating	4, 4X			
Manual Override	7.6" HandWheel			
Control	On/Off/Jog/Proportional			
Duty Cycle	See Graph Below			
Case material	Aluminum Alloy, Powder Coated			
Motor Protection	Split Phase Capacitor			
120/230vac Operation	275°F/135°C Thermal F Class			
Motor Protection	DC Brush Type			
12/24v (AC) Operation	275°F/135°C Thermal F Class			
Ambient Temperature	-22°F to +150°F			
Operating Range	-30°C to +65°C			

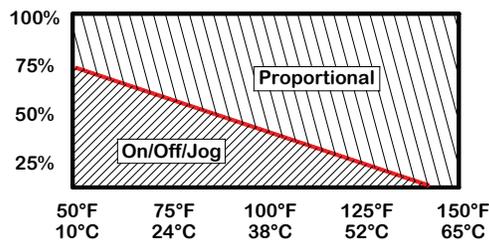


An electric actuator designed for load requirements ranging from 3500 to 4400"lbs. The actuator comes standard with two auxiliary switches (Form C), an internal low power heater, a NEMA 4X environmental rating, and in 120vac or 230vac supply voltages. The P4/5 mechanical connections utilize an ISO5211 mounting system. The P4/5 Series can be ordered as an on/off or two position model that can also be used in bump/jog applications. Or it can be ordered with an advanced internal proportional control card that accepts a wide range of control signals, generates multiple feedback signals, and has look-ahead fault prevention.



SD08\_P45F108P35 HV AC Ver D 121808

CSA Certified Duty Cycle Graph



\* Duty cycle is defined as the ratio of run time vs. off time and is a function of ambient temperature.

\*\* Controlled Duty cycle is a proprietary function. (Please contact your local distributor for information)

See Pg 4 for Options

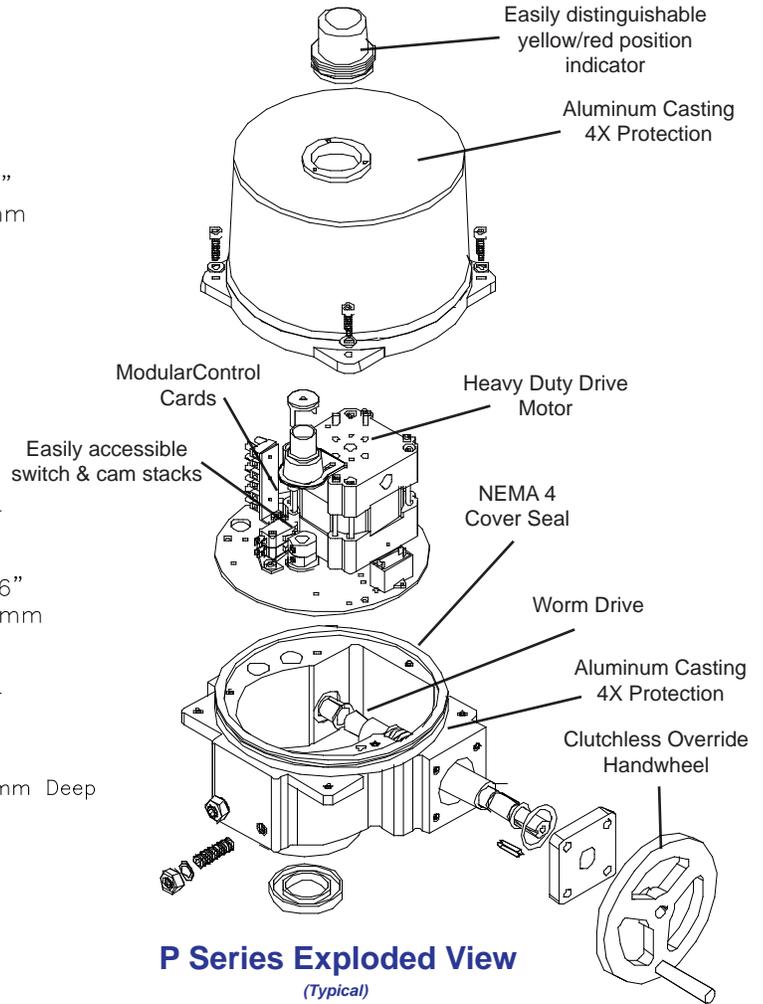
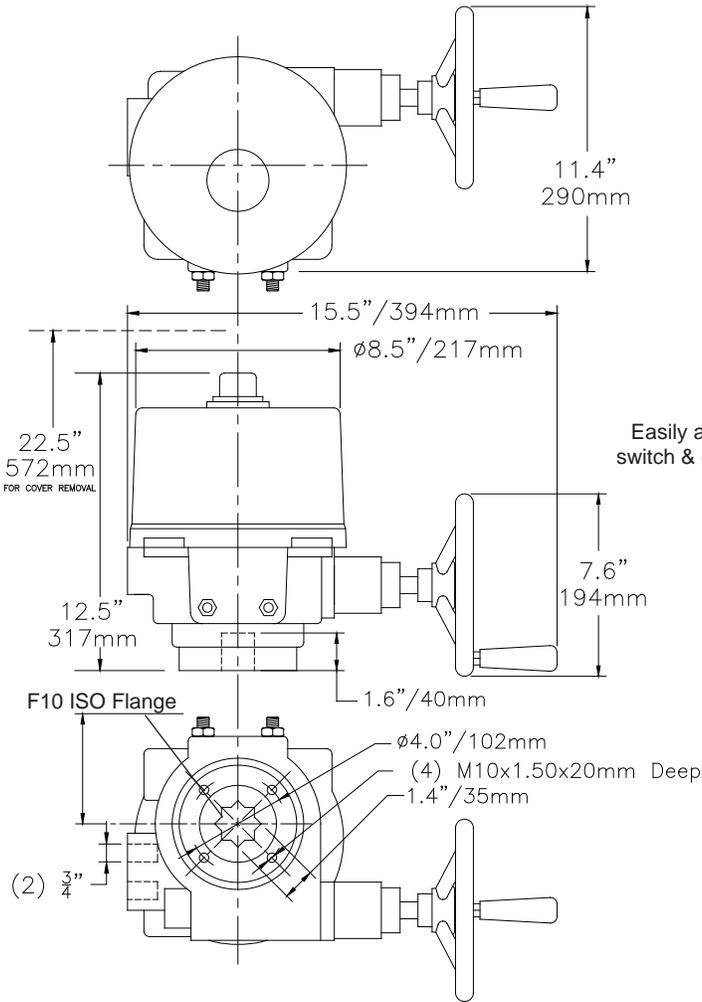
Also available in 12V & 24V AC or DC operation, and in 3 phase models for 230/3/60, 380/3/60 & 480/3/60 supplies. Separate spec sheets are available for these configurations.



### Application Notes:

1. These actuators are designed to be used in either a horizontal or upright position.  
Do NOT mount the actuator with the top below a horizontal position.
2. When installing conduit, use proper techniques for entry into the actuator. Use drip loops to prevent conduit condensate from entering the actuator.
3. Both NPT conduit ports MUST use proper equipment to protect the NEMA 4x integrity of the housing.
4. The internal heater is to be used in ALL applications.
5. Do NOT install the actuator outdoors or in humid environments unless it is powered up and the heater is functioning.
6. Use proper wire size to prevent actuator failure (see chart below for proper wire sizing).
7. Mechanical travel stops are factory calibrated for 90 degree operation. These stops are NOT designed to adjust mechanical rotation by more than +/- 3 degrees.

### P4/5 Series Dimensional Data



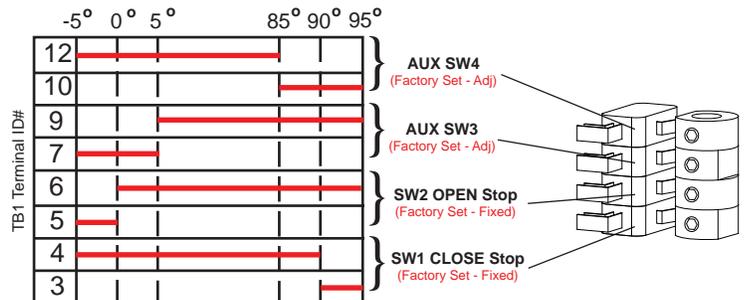
Wire sizing data is provided in the table below to assist in the selection of the proper wire size for ProMation P4/5 series actuators using various wire sizes over distance. Please make sure to reference the correct voltage and do not exceed the indicated length of the wire run for each model.

### Wire Sizing Data

MAX distance between Actuator and Supply (feet)		
Wire Gage	P4/5-120 3.1A	P4/5-230 1.5A
18	267	1056
16	419	1659
14	677	2681
12	1035	4100
10	1760	6970
8	2626	10403

Switch sequencing data is provided in the table below to show the change-of-state points during the rotation of the actuator from OPEN to CLOSED and back again. Switches for terminals 3 thru 6 are set at the factory and should NOT be changed. The INCLUDED auxiliary switches SW3 & SW4 are for terminals 7 thru 12 and those setpoints may be modified if need be. When so optioned, SW5 & SW6 auxiliary switches are initially set to function the same as auxiliary switches SW3 & SW4.

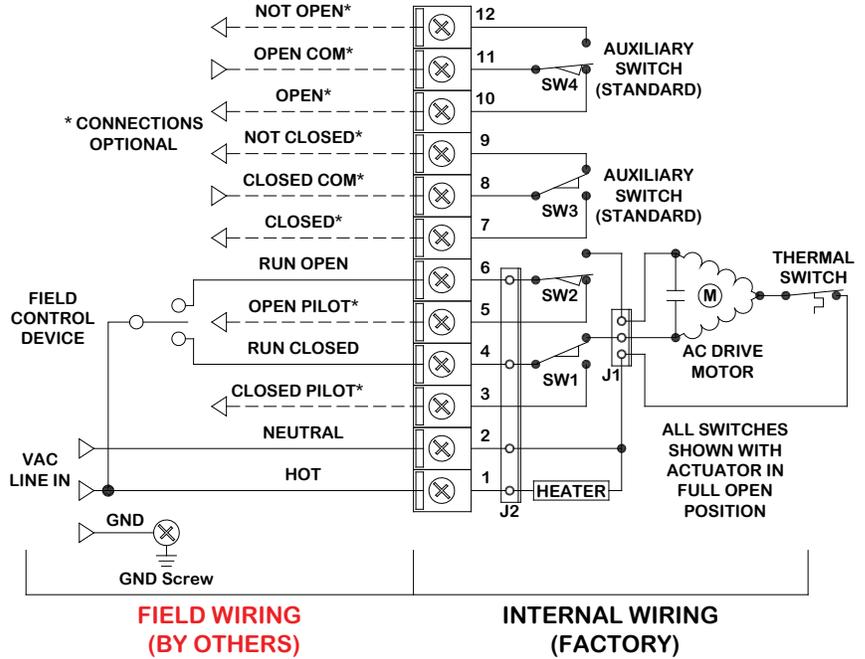
### Switch Logic Map and Switch/Cam Arrangement



# Wiring Diagrams for P Series -

## On/Off/Jog Control

Field Control Device may be relay contact, Switch or Triac type. Pilot device 10A MAX. Auxiliary switches are rated 10A @ 250vac MAX. Terminals 7-12 are dry type Form C. Terminals accept 12-18ga solid/stranded wire.



*Pertains to 120vac & 230vac models.*

Control Signal Inputs (selectable and programmable):  
0-10vdc, 1-5vdc, 2-10vdc, 0-20mA, 4-20mA

Common can be ground referenced or isolated from ground.

Input impedance: 135k ohms (0-10vdc)  
250k ohms (0-5vdc)  
250 ohms (4-20mA)

Sensitivity: 50mV (0-10vdc)  
20mV (1-5vdc)  
80uA (4-20mA)

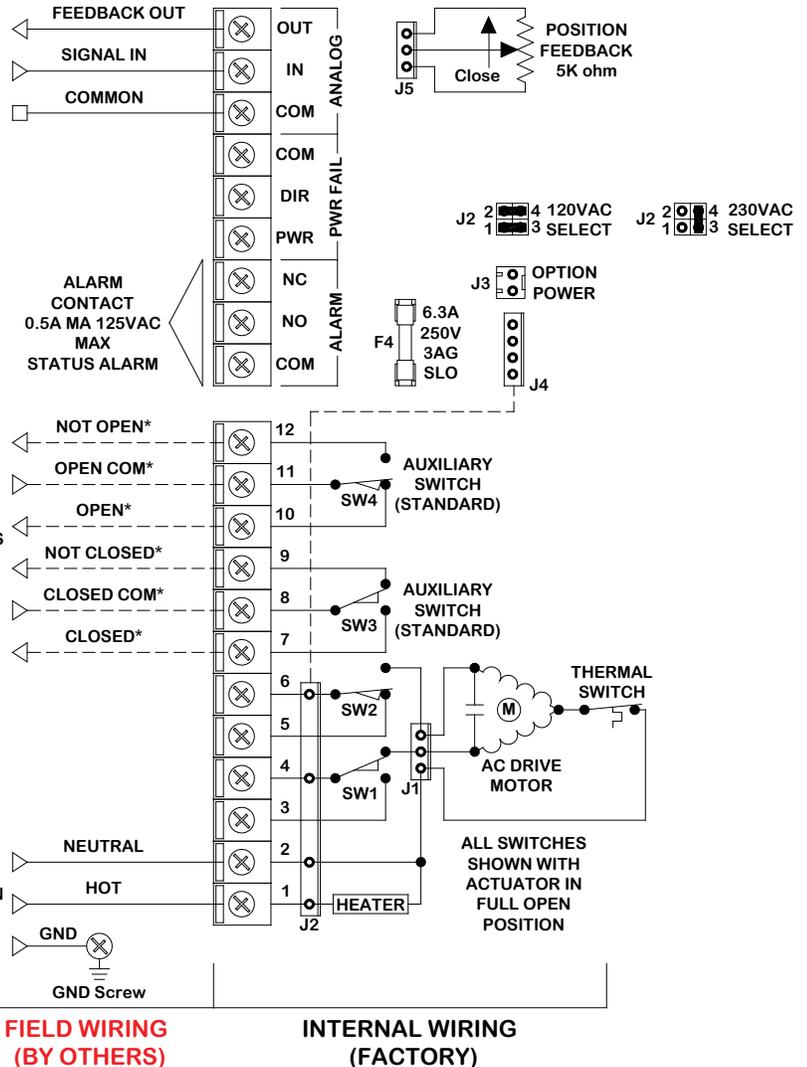
Feedback Signal Output (selectable and programmable):

1-5vdc, 0-10vdc, 2-10vdc, 4-20mA  
Referenced to the common terminal.  
Max Load: 500 ohms

Alarm contacts and PWR FAIL connections are detailed in the [PEI Controller Manual](#).

Main Switch Card Terminals accept 12-18ga solid/stranded wire.

Proportional Control Card Terminals accept 14-22ga solid/stranded wire.



SD08\_P45F108P35 HV AC Ver D 121808

## Local Control Options



**LA**

Basic Version  
No indicator lamps  
No remote status outputs  
No aux switch pass-through

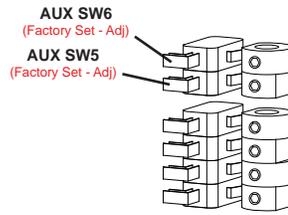
**LB**

Mid-Level Version  
2 status indicator lamps  
2 status HOT outputs  
No aux switch pass-through

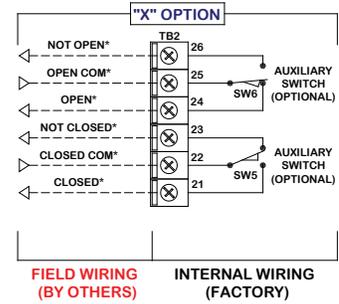
**LC**

Full Version  
4 status indicator lamps  
Remote status monitoring  
Aux switch termination block

## +2 Auxiliary Switch Option

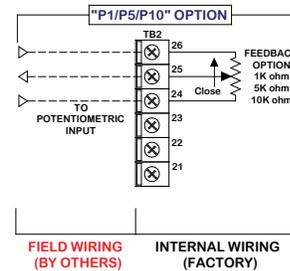


Switch/Cam  
Arrangement



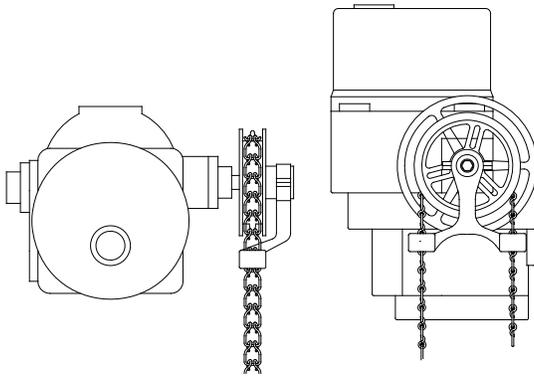
The **X Option** consists of 3rd & 4th auxiliary switches factory mounted. This is NOT a field installed option. This option can be used with On/Off and Proportional control actuators. It is available on P2 thru P13 series actuators, and must be ordered with actuator.

## Potentiometric Feedback Option



The **P# Option** is a potentiometric feedback for On/Off actuators. This is NOT a field installed option. This option can be used only with On/Off actuators. It is available on P2 thru P13 series actuators. This option requires the selection of 1k, 5k or 10k ohm resistance values, and must be ordered with actuator.

## Chain Wheel Options



The **C Option** is a mechanical Chain Wheel system that converts the manual override handwheel to a chain driven override for use in applications where the actuator is mounted at a distance above the floor. (Must be used with one of the above Local Control Options, see the options guide for details)

These tables indicate which options are available in On/Off and Proportional control actuators, as well as which options are compatible with each other.

Proportional Options Compatibility			
	C	L	X
C	-	yes	yes
L	yes	-	yes
X	yes	yes	-

On/Off Options Compatibility				
	C	L	X	P1,5,10
C	-	yes	yes	yes
L	yes	-	yes	yes
X	yes	yes	-	n/a
P1,5,10	yes	yes	n/a	-



**PROMATION  
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Precision Actuation for Industry